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ABSTRACT

Intended as a helpful bibliography of electrification teaching materials, this book was prepared by the Farm Electrification Council. The teaching materials listed are prepared for specific purposes and areas of instruction such as vocational agriculture, technical occupations, trade and industry, and 4-H Club Electric Project work. Titles, personal and institutional authors, page count, date, cost, grade level, and addresses are included for the more than 400 course outlines, guides, texts, manuals, bulletins, and visual aids. The educational levels are identified as primary school, secondary school and postsecondary school. (GB)

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# FEC Bibliography

## a
## reference listing
## of
## ELECTRIFICATION
## EDUCATION
## PROGRAMS
## and
## MATERIALS

VT012153

Published by the Farm Electrification Council

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## INTRODUCTION

This book is intended as a helpful bibliography of electric and electrification teaching materials, rather than a comprehensive coverage of all farm electrification application and promotional publications and films. The teaching materials listed are the ones prepared for specific purposes and areas of instruction such as Vocational Agriculture, Technical Occupations, Trade and Industry, and 4-H Club Electric Project work. Only a few pertinent references are included that give application (use) information.

Program as used in this Bibliography refers to in-school and out-of-school instruction including factual information, curriculum materials, course outlines, and teaching aids.

Materials include technical information, teaching guides, demonstration equipment ideas, demonstration guides, charts, slides, films, text books, handbooks, bulletins and circulars.

The educational level of each item reviewed is expressed as P, for Primary School; S, for Secondary School; and PS, for Post Secondary School work. The section listing 4-H Club Electric Project program materials uses the standard 4-H Club designations of B, for Basic; I, for Intermediate; and S, for Senior.

The listings under the five main categories are code-numbered and give the title in capitals, then related information, educational level abbreviations, size, date published when available, and source. This information is followed by a brief paragraph giving contents and comments.

All items marked with an asterisk (*) are available for review in the Farm Electrification Council library. Items may be borrowed for review without charge by FEC members, or you may visit the library and inspect items of interest. It is located at 815 Oak Brook North, Oak Brook, Illinois.

Since it is quite impossible to reach all sources of helpful and excellent teaching materials, a revision of this Bibliography is planned for an appropriate future time. The Farm Electrification Council will appreciate suggestions for inclusion of missed or new materials, corrections, and deletions of no longer available items.

We are most appreciative of the help given us by educators at colleges, universities, and technical schools, agricultural engineers, power supplier representatives, publishers, state department of education people, the Cooperative Extension Service, USDA staff personnel, and representatives of the U. S. Department of Health, Education, and Welfare. Special thanks go to the Education Committee of the Farm Electrification Council for their suggestions and guidance.

The Editor

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### EDUCATIONAL LEVEL CODE

**P—Primary School (Elementary grades)**
**S—Secondary School (Junior & senior high)**
**PS—Post Secondary School**

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## VOCATIONAL AGRICULTURE ELECTRIC PROGRAM

### Electrification Teaching Materials, Course Outlines, and Guides

VA-1 *GUIDE FOR TEACHING PRACTICAL ELECTRICITY, for Farm and Home, Farm Service Department of the Ohio Edison Company, S, PS, 8½ x 11 spiral bound, 150 pp., 1964, Ohio Edison Company, Akron, OH 44308.

This teaching guide is arranged to be used with an electrical demonstration board. Charts, diagrams, photographs and references cover electricity, definitions, wiring, planning, motors and controls, standards, and quality ratings. It is approved by Kent State, Ohio State, Ohio State Department of Education, and Ohio Vo-Ag Teachers Association.

VA-2 *ADEQUATE WIRING, Instructors Guide, Arkansas Rural Electrification Council and State Department of Education, S, PS, 8½ x 11, 61 pp., 1960, State Department of Education, State Education Building, Little Rock, AR 72201.

The teaching guide gives information and facts that will help in preparing for teaching adequate wiring. This information is designed to acquaint students with present and future problems in wiring systems. The material is divided into three parts: terminology, understanding, planning and practical residential wiring. The parts are divided into jobs and jobs are divided into—objectives, information for teachers, materials, references, teacher activities, and student practice.

VA-3 *TEACHING ELECTRICITY IN VOCATIONAL AGRICULTURE, Curtis R. Weston in cooperation with Agricultural Education Department and State Department of Education, P, S, PS, 8½ x 11 litho., 25 pp., 1966, Instructional Materials Laboratory, University of Missouri, 8 Industrial Education Building, Columbia, MO 65201.

A suggested procedure and course outline for teaching electricity to vo-ag students, young farmers, and adult farmer classes covers understanding electricity, basic electrical terms, magnetism and electromagnetic induction, wire sizes and types, principles of wiring switches and circuits, circuit protection, selection, care and operation of electric motors, and planning the farmstead wiring.

VA-4 *AIDS TO USING ELECTRICITY ON INDIANA FARMS, Harry W. Leonard and Paul E. Johnson, Purdue University, Department of Agricultural Education and Agricultural Engineering, respectively, P, S, PS, 8½ x 11, 57 pp., 1964, available from Indianapolis Power & Light Co., 25 Monument Circle, Indianapolis, IN 46206.

This guide book provides a busy teacher with accurate information for use with his classes. The units are not designed to serve as lesson plans, allowing the teacher to do his own planning, but do cover the more important points which must be considered in using electricity on the farm.

VA-5 *ELECTRIC MOTORS FOR FARM USE, S, PS, 8½ x 11 printed, 53 illustrations, 30 pp., 1965, $0.45, Vocational Agriculture Service, College of Agriculture, University of Illinois, Urbana, IL 61801.

This text and laboratory guide used by vocational agriculture teachers in Illinois was prepared to accompany the electric motor kit. The kits are jointly sponsored by the Vocational Agriculture Service and the Illinois Farm Electrification Council. This booklet is good even without the kit.

VA-6 *ELECTRICAL CONTROLS KIT MATERIALS, four items, developed in cooperation with the Illinois Farm Electrification Council, S, PS, 8½ x 11, University of Illinois Vocational Agriculture Service, 434 Mumford Hall, Urbana, IL 61801.

1—APPLYING ELECTRICAL CONTROLS IN FARM PRODUCTION, 10 pp., printed, $0.10 plus postage. This is a guide to be used with the motor controls kit designed to teach a student the fundamentals and characteristics of many kinds of motor controls and to apply this knowledge in practical work exercises.

2—SUGGESTIONS TO THE TEACHER in using the electrical controls kit, 8 pp., single copy free with each order. This item gives suggestions for using the electrical controls kit and supplies the answers to the questions which are asked in the exercises developed for use with this kit. See Exercises for use with electrical controls kit, Item 3, below.

3—EXERCISES FOR USE WITH ELECTRICAL CONTROLS KIT, 45 pp., $0.25 plus postage, 1966. A series of 17 exercises are given to be used with the electrical controls kit developed by the University of Illinois in conjunction with the Illinois FEC. It lists equipment needed for teaching each exercise and the procedures together with questions to be answered by the students.

VA-7 *ELECTRICAL CONTROL WORKSHOP, S, PS, 8½ x 11, 72 pp., 1965, write for cost information, The Potomac Edison Company, Downsville Pike, Hagerstown, MD 21740.

This material is designed to give the vocational agriculture teacher and his students a better understanding of the operation of electrical controls. These lessons are based on the electrical controls course developed by the University of Illinois and the Illinois Farm Electrification Council.

VA-8 *ELECTRICAL WIRING FUNDAMENTALS AND PLANNING, S, PS, 24 pp., 1965, $0.30 per copy, Vocational Agriculture Service, College of Agriculture, University of Illinois, Urbana, IL 61801.

This punched page booklet covers fundamentals of electricity, safety, and adequacy, selecting wiring materials and devices, and planning the farm wiring system. It is a companion piece to Item VA 9, Electrical Wiring Procedures and Exercises, from the same source.

VA-9 *ELECTRICAL WIRING PROCEDURES AND EXERCISES, S, PS, 8½ x 11, 32 pp., printed, 1965, $0.40 per copy, Vocational Agriculture Service, College of Agriculture, University of Illinois, Urbana, IL 61801.

This punched page booklet covers bringing electrical service to a building, bringing it into a building, installing various interior wiring electrical services, and wiring exercises. This is a companion piece to Item VA 8 Electrical Wiring Fundamentals and Planning, from same source.

VA-10 *ELECTRICAL HAZARDS ON THE FARM, P, S, PS, 8½ x 11, 12 pp., 1965, $0.15 per copy, Vocational Agriculture Service, 434 Mumford Hall, University of Illinois, Urbana, IL 61801.

This punched page booklet gives information on specific causes of farm electrical hazards, factors contributing to electrical hazards, grounding, first aid for treatment of electrical injuries, fighting electrical fires, circuit survey, and farm electrical hazard checklist.

VA-11 *FARM ELECTRIFICATION, Potomac Edison System Staff, S, PS, 8½ x 11, 80 pp., 1965, write for information on availability and cost, The Potomac Edison Company, Downsville Pike, Hagerstown, MD 21740.

This lesson plan manual presents 13 farm electrification demonstration lessons for teaching electrical terms, circuits, wiring materials, effect of size of wire on the operation of equipment, protection, and farm wiring design. It is complete with photographs, charts, diagrams, and tables and coordinates the information with the use of a wiring demonstration board.

VA-12 *ELECTRICAL WIRING INFORMATION BOOKLET, S, PS, 8½ x 11 litho., 13 pp., 1966, The Connecticut Light and Power Company, Farm Service Dept., P.O. Box 2010, Hartford, CT 06101.

This teaching aid was designed for use with a "Wire Sample Board", It covers wire types, wire sizes, insulation of conductors, selection of proper wire sizes, and is complete with tables from the 1962 edition of National Electrical Code.

VA-13 *FARM ELECTRIFICATION, Learning To Do by Doing, P, S, 8½ x 11, 45 pp., printed, Central Power and Light Company, P.O. Box 2121, Corpus Christi, TX 78403.

This Future Farmers of America booklet is published annually in connection with their awards program and covers fundamentals of electricity, skills in using electricity, projects in electricity, exhibits, demonstrations, and the awards program for students.

VA-14 *ELECTRICAL CONTROLS FOR THE FARM, S, 8½ x 11, 18 pp., 1964, free to teachers in Alabama, Alabama Power Company, Box 2641, Birmingham, AL 35200.

This is a program for vocational agriculture teachers and includes switches, sensing devices, relays, motor control devices, and diagrams on line voltage switching, electrical relays, and motor control.

VA-15 *ADULT FARMER EDUCATION IN VOCATIONAL AGRICULTURE, PS, 8½ x 11 mimeo., 16 pp., 1963, State Board of Education, Raleigh, NC 27600.

Areas covered in this course include fundamentals of electricity, installation, and minor repair of conveniences, electric motors, and economics for electrical use.

VA-16 *ELECTRICAL FUNDAMENTALS BOOKLET, Edward S. Pira, Assistant Professor, Agricultural Engineering, College of Agriculture, P, S, PS, 8½ x 11, 46 pp., 20 illustrations, $0.55 per copy, University Book Store, Student Union Building, University of Massachusetts, Amherst, MA 01002.

Here is a booklet that deals with the fundamentals of electricity with no attempt made to show some of the complicated equipment as it actually exists. Also, many of the forces and variables that affect electrical output in one way or another are not included.

VA-17 BASIC ELECTRICITY, 18 Lesson Course (Correspondence), S, PS, $77.00, Independent Study Program, Graduate School, United States Department of Agriculture, Washington, DC 20250.

This USDA Graduate School Independent Study Course is primarily for employed people. No previous knowledge of electricity is required. Basic mathematics or equivalent is desirable.

VA-18 BASIC ELECTRONICS, 16 Lesson Course (Correspondence), S, PS, $102.00, Independent Study Program, Graduate School, United States Department of Agriculture, Washington, DC 20250.

This USDA Graduate School Independent Study Course is primarily for employed people. Completion of the Basic Electricity Course is highly desirable.

***Indicates items that are in FEC Library**

VA-19 **ELECTRICAL WIRING**, 18 Lesson Course (Correspondence), S, PS, $74.00, Independent Study Program, Graduate School, United States Department of Agriculture, Washington, DC 20250.

This USDA Graduate School Independent Study Course is primarily for employed people. Completion of the Basic Electricity Course is desirable. High school mathematics necessary.

VA-20 ***ELECTRICAL TIPS FOR EVERYONE**, Correspondence Course No. 152, Paul M. Anderson, S, PS, 1963, $4.25 per single copy, over 5 copies $3.75 per copy, Correspondence Courses In Agriculture, The Pennsylvania State University, 202 Agricultural Education Building, University Park, PA 16802.

Ten lessons treat in a practical manner the function and use of the electrical wiring system for the home. Motors and controls constitute an important part of this course. Trouble shooting and "do-it-yourself" jobs are discussed. Drawings and pictures are utilized frequently to illustrate the subject matter which is presented. The cost includes correcting, grading, and returning the question papers.

VA-21 ***STUDY GUIDE FOR WIRE SAMPLES IN ELECTRICAL WIRING KIT**, S, 5½ x 8½, 10 pp., 1966, $0.05 per copy, Vocational Agriculture Service, College of Agriculture, University of Illinois, 434 Mumford Hall, Urbana, IL 61801.

This study guide presents information about 21 types and sizes of wire and cable, including allowable ampacities, restrictions on use, etc. It also serves as a key for identifying the wire samples found in the Vo-Ag Service wiring kit.

VA-22 ***BASIC ELECTRICITY AND PRACTICAL WIRING LESSONS**, Student's Manual, Teacher Education Series, Volume 10, Number 1, Harry J. Hoerner and Russell C. Wilson, S, PS, 8½ x 11, 26 pp., 1969, $0.50 per copy, Department of Agricultural Education, The Pennsylvania State University, University Park, PA 16802.

This workbook-type manual is used by students to answer questions and record data as the teacher performs basic demonstrations within the framework of six lessons covering: basic circuits; Ohm's Law; measuring electric power and costs; switching; grounding for safety; and wiring for safety. The seventh lesson recommends a simple and inexpensive individual student wiring board upon which students do common and practical wiring skills.

VA-23 ***BASIC ELECTRICITY AND PRACTICAL WIRING LESSONS**, Teacher's Manual, Teacher Education Series, Volume 10, Harry J. Hoerner and Russell C. Wilson, S, PS, 8½ x 11, 36 pp., 1969, $1.00 per copy, Department of Agricultural Education, The Pennsylvania State University, University Park, PA 16802.

Prepared for use with the Student's Manual for Basic Electricity And Practical Wiring Lessons. Preface gives a list of equipment and material needed for teaching the unit. Aids the teacher by picturing constructed equipment and set-up of selected demonstrations. Contains answers to all the questions asked in the Student's Manual, except data that is gathered by the class during demonstrations.

VA-24 **FARM ELECTRICITY**, Tennessee Department of Education in cooperation with TVA, S, PS, 8½ x 11, 96 pp., 1970, Vocational Curriculum Laboratory, Box 1114, Mufreesboro, TN 37130.

Consists of four units covering: fundamentals of electricity; wiring and materials; farm motors; and electric controls. Each unit is illustrated. Lists equipment, materials, and references.

VA-25 **SUCCESSFUL FARMING VO-AG TEACHING SERVICE**, C. W. Dalbey, S, PS, 1970, $100.00 for the five units, W. G. Pitzer, Sales Director, Successful Farming, 1716 Locust Street, Des Moines, IA 50303.

The initial five teaching units in this series cover: farm machinery management; agricultural career opportunities; farm management; soils management; and money management. Transparencies, slides, sound tapes, wall charts, and pre-screened references are included to bridge the gap between the reference material and the teaching process thereby providing a new format which will promote more effective individual and classroom activity. The lesson problems often include the application of electricity as a source of heat, power, and light for specific agricultural operations.

VA-26 **FARM ELECTRICITY**, A Manual For Students of Vocational Agriculture, Harry W. Kitts and Marvin Nabben, S, PS, 8 x 10, 154 pp., 1968, $4.50 per copy, Agri-Aide Company, 3521 46th Avenue, South, Minneapolis, MN 55406.

This manual serves as a classroom guide for teaching electricity to vo-ag students. It may also be used for lab work that utilizes deomonstration equipment.

VA-27 **ELECTRIC MOTORS**, Lesson Plans For Agricultural Production, W. E. McCune & Robert C. Jaska, S, PS, 8½ x 11, 102 pp., 1969, $1.55, Agricultural Education Teaching Materials Center, Texas A&M University, College Station, TX 77843.

This teaching guide consists of eight lesson plans covering: introduction to electric motors; split phase motors; repulsion start induction run motors, miscellaneous motors, motor protection and control; motor drives, pulleys and belts; and care and maintenance of electric motors. The lesson plans include 38 masters for transparencies, Appendix A—assembling a toy motor, Appendix B—characteristics of electric motors, and Chart 1—motor ailments. Each lesson plan gives teaching objectives, teaching aids needed, and suggested procedure for conducting the lesson plan.

**EDUCATIONAL LEVEL CODE**

**P—Primary School (Elementary grades)**
**S—Secondary School (Junior & senior high)**
**PS—Post Secondary School**

VA-28 FARM ELECTRIFICATION LESSON PLANS, Electrical Controls and Basic Control Circuits Used In Agricultural Production, W. E. McCune & Robert C. Jaska, S, PS, 8½ x 11, 58 pp., 1967, $0.75, Agricultural Education Teaching Materials Center, Texas A&M University, College Station, TX 77843.

This teaching guide consists of five lesson plans covering: introduction to electric controls; switches and switch control circuits; relay devices; motor control devices; and automatic sensing control devices. The lesson plans include 15 masters for transparencies, 47 illustrations, and Appendix A. Each lesson plan gives teaching objectives, teaching aids needed, and suggested procedure for conducting the lesson plan. Appendix A is an answer guide for questions asked in the lesson plan.

VA-29 FARM ELECTRIFICATION LESSON PLANS, Wiring and Safety, W. E. McCune & Robert C. Jaska, S, PS, 8½ x 11, 86 pp., 1967, $1.30, Agricultural Education Teaching Materials Center, Texas A&M University, College Station, TX 77843.

This teaching guide consists of seven lesson plans covering: fundamentals of electricity; electrical safety; splices and connections; selecting wire sizes; wiring materials; planning the wiring layout and practice wiring. The lesson plans include 46 masters for transparencies, 10 tables, and plans for five wiring demonstration boards. A selected set of 38 transparencies of these masters is available from the above source for $5.75. Each lesson plan gives objectives, materials needed, and suggested procedure to be followed in presenting the lesson plan.

VA-30 FARM AND HOME ELECTRICITY COURSE, S, 1970, prepared by the Kansas Farm Electrification Council, price available upon request, Cliff Eustace, Kansas State Board of Vocational Education, 120 E. 10th St., Topeka, KS 66612.

This course includes 48 lessons covering 80 class periods or one full semester of instruction. Developed for use in the secondary schools of Kansas, it covers fundamentals of electricity, farmstead wiring, electric motors, and individual project construction. Includes a complete teaching outline for the instructor.

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## VOCATIONAL-TECHNICAL AND TRADE AND INDUSTRY ELECTRICAL PROGRAM

### Electrification Teaching Materials, Course Outlines, and Guides

T&I-1 *APPLIED ELECTRICITY, for Industrial Arts, S, PS, 8½ x 11 spiral bound, 159 pp., 1963, $2.00, Instructional Materials Laboratory, University of Missouri, 8 Industrial Education Building, Columbia, MO 65201.

This course of study presents experiments and activities presenting principles and their application as a most effective method of instruction. It includes references, job sheets, teaching plans, evaluation of materials, instructional aids, shop equipment, and supplies.

T&I-2 *CURRICULUM MATERIALS, for Trade and Industrial Education, S, PS, 8 x 10½, 68 pp., 1969, single copies available free of charge, Division of Vocational & Technical Education, U.S. Office of Education, Washington, DC 20202.

This is an annotated listing of materials available from public education agencies.

T&I-3 *ELECTRICAL TRADES, for Vocational High Schools, Bureau of Trade and Technical Education, S, PS, 8½ x 11 spiral bound, 102 pp., 1958, The University of the State of New York, State Education Department, Albany, NY 12200.

This electrical trades syllabus brings into curriculum development "know how" and "experience". It gives content and scope, plus ideas for more effective teaching. It includes references for visual aids and texts. It lists suggested tools, instruments, and equipment.

T&I-4 *ELECTRONIC TECHNOLOGY, Course Outline, S, PS, 8½ x 11 spiral bound, 50 pp., 1966, West Virginia State Board of Education, Bureau of Vocational, Technical, and Adult Education, State Capitol, Charleston, WV 25300.

The syllabus gives proposed courses of study of three years and two years. Enrolling students will be in the ninth or tenth grade. The electronic program covers DC, AC, basic electronics, communications, AM radio, FM radio, transistors, pulse circuit fundamentals, and television. The program for the post-secondary level covers microwave components and systems, equipment lists, and instruction aids.

T&I-5 *INDUSTRIAL ELECTRICITY, Course Outline, P, S, PS, 8½ x 11 spiral bound, 40 pp., 1965, West Virginia State Board of Education, Bureau of Vocational, Technical and Adult Education, State Capitol, Charleston, WV 25300.

**All materials are 8½ x 11, unless indicated otherwise.**

This is a syllabus, not a course of study. The courses outlined are designed to start with persons 15 years old or older. Objectives are to acquaint students with vocational opportunities, care and use of instruments and tools, applied technical information of the trade, and specific skills. Offerings include fundamentals, joints, circuits, equipment, wiring, repairing, and winding motors. An equipment list and text bibliography are included.

T&I-6 *APPRENTICE INSIDE WIREMAN, Instruction Outline, S, PS, 8½ x 11 mimeograph, 15 pp., 1966, Wisconsin Board of Vocational, Technical, and Adult Education, Room 720, 1 West Wilson Street, Madison, WI 53702.

This outline was designed for the instruction of apprentices. It also lists references.

T&I-7 *APPRENTICE POWER LINEMAN, Instruction Outline, S, PS, 8½ x 11 mimeograph, 4 pp., 1966, Wisconsin Board of Vocational, Technical, and Adult Education, Room 720, 1 West Wilson Street, Madison, WI 53702.

This outline was designed for the instruction of apprentices. It also lists references.

T&I-8 *ELECTRONIC TECHNOLOGY, Engineering Technology, Series No. 2, PS, 8½ x 11 paperback, 67 pp., 1964, Illinois Board of Vocational Education, 405 Centennial Building, Springfield, IL 62706, or College of Engineering, University of Illinois, Urbana, IL 61801.

This suggested four-semester program was developed by the Engineering Technology Curriculum Advisory Committee of the College of Engineering, University of Illinois. The proposal is in complete detail and includes the mathematics, physics, and orientation courses necessary to provide a high level of understanding of the technical as well as the industrial aspects of electronics.

T&I-9 *INSTRUMENTATION TECHNOLOGY, A Suggested 2-Year Post High School Curriculum, by Office of Education, U.S. Department of Health, Education, and Welfare, PS, 8½ x 11 printed, 119 pp., 1966, $0.75, Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

The courses outlined in the plan of study are designed and organized to provide a knowledge of the physical sciences and of control devices. They help develop the technical skills involved in their application to instrument control of processes, systems, and operations in modern industry.

T&I-10 LIGHTING FUNDAMENTALS COURSE, ED-2, S, PS, 1961, 108 pp., $5.00, 25% discount for 100 or more copies, Illuminating Engineering Society, Publications Sales Office, 345 East 47th Street, New York, NY 10017.

The text covers basic lighting education in twelve outlined lessons, including physics of light and vision, light sources, illumination design and lighting application problems for six different areas. Students learn how to make actual layouts, measurements, and analysis.

T&I-11 *COURSE OF STUDY OUTLINE, Industrial Electricity, William L. Springer, S, 8½ x 11 spiral bound, 40 pp., 1965, Sussex County Vocational-Technical Center, Highway 28, Georgetown, DE 19947.

This industrial electricity course is intended for male high school students interested in securing employment in the electrical field. It is in-the-main a shop course covering house wiring, motor winding, motor control, electrical generators, and industrial wiring.

T&I-12 INDUSTRIAL AND COMMERCIAL POWER DISTRIBUTION COURSE, a technical training program, PS, 1969, $600.00, The Electrification Council, 750 Third Avenue, New York, NY 10017.

This training course is distributed in kit form, complete with detailed instructions on the best methods for conducting the program. The course consists of 10 demonstration-type lectures on the following subjects: fundamentals; motor circuits; system voltage variation; power factor improvement; selection and application of protective devices; system grounding, motor control; system planning, load estimating; system planning, medium voltages; medium voltage, protective relaying; and protective relaying, relay coordination. The course leader's guide contains listings of suggested demonstration equipment and additional special visual aids and other equipment that may be secured from manufacturers and others. In addition to the guide book, the kit also contains student textbooks, slides, charts, and course diplomas. A set of 125 Master Viewgraphs is available at an additional $200.00.

T&I-13 ELECTRIC HEATERS AND HEATING DEVICES FOR INDUSTRY, a technical training program, PS, 1969, $600.00, The Electrification Council, 750 Third Avenue, New York, NY 10017.

This is an eight-session course in the fundamentals of applying electricity to low temperature heating jobs. Each session is two hours. Following subjects are covered: the ways of producing heat electrically; heat transfer methods; liquid heating; surface heating and pipeline heating; process air heating and soft metal melting; comfort heating of air and radiant infrared heating equipment; details on infrared industrial process heating; infrared radiant "people" heating; and general electric heating economics. Distributed in kit form, this program provides a course leader's guide, student textbooks, slides, charts, and course diplomas.

T&I-14 MOTORS AND MOTOR CONTROLS, a technical training program, PS, 1969, $760.00, The Electrification Council, 750 Third Avenue, New York, NY 10017.

This course consists of eleven two-hour sessions using the programmed instruction method for the following subjects: basic principles; fundamentals of motor control; single phase motors and controls; polyphase induction motors; control for polyphase induction motors; synchronous motors and controls; D-C motors and controls; and maintenance of motors and controls. Distributed in kit form, this program provides a guide book for course leaders, student textbooks, slides, charts, and course diplomas.

T&I-15 COURSE 61, a broad and practical course in electricity, S, PS, $125.00 tuition fee includes books and reference materials, Power and Electronic Institute, Bushnell, IL 61422.

This two-week in-residence course is designed especially for farm managers and operators and those connected with farm and home equipment sales, light industry, and home construction and repair. Through a combination of classroom and lab work, it is designed to impart a working knowledge of basic electricity. Covers wiring systems, lighting, heating, power, and control and automation devices for farm, home, and light industry. Open to both men and women. No prior knowledge of electricity is required for enrollment. This course is licensed and approved by the Illinois State Department of Registration and Education.

T&I-16 ELECTRICAL APPLIANCE SERVICING, S, PS, 8½ x 11, 150 pp., 1966, $1.50 for Student's Manual, $0.50 for Instructor's Key, Instructional Materials Laboratory, Industrial Education Building, University of Missouri, Columbia, MO 65201.

This course of study is designed for part-time students who are employed in electrical appliance stores.

T&I-17 *UNDERSTANDING AND MEASURING HORSEPOWER, W. Harold Parady and George W. Smith, Jr. S, 8½ x 11, 72 pp., 1969, $3.00 per copy, American Association For Vocational Instructional Materials, Coordinator's Office, Engineering Center, Athens, GA 30601.

This excellent study guide covers the basic physics involved in understanding horsepower and torque. The illustrations and information are greatly simplified over the usual physics-type of explanation. Contains four major sections. The first deals with an understanding of power terms, and the relationship of horsepower, speed, and torque for motors and engines. The second discusses means of determining the size of power unit to use. The third deals with the various types of dynamometers that are available for measuring horsepower. The fourth discusses how to measure horsepower and interpret the results.

**All materials are 8½ x 11, unless indicated otherwise.**

**T&I-18 ELECTRICAL WIREMAN**, S, PS, 8 x 11, 122 pp., 1968, $1.75 for Study Guide, $1.25 for Answer Book, Vocational Industrial Education Department, University of Alabama, P.O. Box 2847, University, AL 35486.

This study guide and record of progress in electrical wiring is for individual use in a cooperative training program. The material is divided into three sections: fundamentals of electricity; house wiring; and commercial wiring.

**T&I-19 *SHORT COURSE ON THE NATIONAL ELECTRICAL CODE**, Course Outline, PS, 4 x 9, 4 pp., 1969, Fred M. Crawford, Extension Agricultural Engineer, 200 Agricultural Engineering Bldg., University of Missouri, Columbia, MO 65201.

This is a syllabus of subjects covered in a six-week short course designed to introduce practicing electricians, and persons with a good understanding of wiring methods and materials, to the National Electrical Code.

**T&I-20 *ELECTRICAL TECHNOLOGY FOR AGRICULTURE**, Course Outline, PS, 4 x 9, 8 pp., 1970, Truman Surbrook, Agricultural Engineering Department, Michigan State University, East Lansing, MI 48823.

This is a syllabus of an 18-month post-high school curriculum being offered by the Institute of Agricultural Technology, Michigan State University. The course provides training in electrical wiring and technology, and agricultural and home equipment systems planning and operation. It has been approved as a Cooperative Veterans Training Program. Graduates are prepared for careers as electricians, equipment servicemen, installers, salesmen, and technicians.

**T&I-21 ELECTRICAL APPLIANCE SERVICEMAN**, OE-87039, Suggested Guide for a Training Course, PS, 8 x 10½, 14 pp., 1969, $0.30, Superintendent of Documents, Government Printing Office, Washington, DC 20402.

Designed to assist school administrators and others in organizing and developing course content to prepare individuals for employment as appliance servicemen. Content is divided into eight units and provides for 840 hours of instruction covering a period of 28 weeks, with 30 hours of instruction per week. Contains suggested lists of textbooks and references, films, equipment, machines, tools, supply list with estimated costs, and a sketch of a training facility.

**T&I-22 VOCATIONAL ELECTRICAL APPLICATION COURSES**, Course Outline, PS, 8½ x 11, 1970, Indianapolis Skills Center, 6800 West Raymond Street, Indianapolis, IN 46241.

The courses outlined were developed by the Metropolitan School district of Wayne Township, Indianapolis, and provide for both day and evening classes. Courses are divided into three main subject areas: heating and air conditioning; television repair and electronics service; and appliance repair.

**T&I-23 ELECTRONICS MECHANIC, ENTRY**, OE-87040, Suggested Guide for a Training Course, PS, 8 x 10½, 14 pp., 1969, $0.30, Superintendent of Documents, Government Printing Office, Washington, DC 20402.

Designed to assist administrators and teachers in organizing courses and developing content for training individuals as electronics mechanics. The guide contains 14 units covering 1500 hours of shop and classroom instruction. Includes suggested lists of machines, tools, equipment, supplies, textbooks, films, and the floor plan for a training facility.

**T&I-24 ELECTRONICS ASSEMBLER**, OE-87032, Suggested Guide for a Training Course, PS, 8 x 10½, 13 pp., 1969, $0.30, Superintendent of Documents, Government Printing Office, Washington, DC 20402.

Intended for reference use by school administrators and others in organizing and developing course content to prepare individuals for employment as electronics assemblers. Content provides for 240 hours of instruction covering a period of six weeks, with 40 hours of instruction per week. Includes suggested lists of textbooks and references, films, machines, tools, equipment lists and costs, and suggestions for teaching the course.

**T&I-25 *VOCATIONAL TECHNICAL INSTITUTE**, Course Outline, S, PS, 6 x 9, 41 pp., 1970, Kansas State College of Pittsburg, Pittsburg, KS 66762.

This information bulletin shows courses available in the Vocational Technical Institute of Kansas State College of Pittsburg. The bulletin includes curriculums and general information for a two-year course in Electricity, a two-year course in Air Conditioning and Refrigeration, and eight other trades which they offer. Information about these programs can be obtained by writing the Director, Vocational Technical Institute, Kansas State College of Pittsburg, Pittsburg, KS 66762.

**T&I-26 ELECTRIC LINEMAN TRAINING**, PS, 8½ x 11, Series 100–$1.82, Series 200–$1.88, Series 300–$1.50, Series 400–$1.75, Instructional Materials Laboratory, Ohio State University, 1885 Neil Avenue, Columbus, OH 43210.

Electric Lineman Training consists of a series of printed, plastic bound manuals developed cooperatively by Ohio electrification personnel and Rural Electrification Job Training and Safety Instructors throughout the nation. The Series 100 Manual includes 45 basic job training procedures and 54 assignment sheets. Emphasis is placed on safe working procedures. Series 200 includes 55 job training procedures and 29 assignment sheets. Safety is stressed throughout this manual. The 300 Series includes 21 training procedures and 29 assignment sheets. This manual is designed to cover the more advanced jobs and technology of the line craft. The 400 Series Manual includes 30 job training procedures and 41 assignment sheets on line craft skills, essential technical information, and safe working practices in order to qualify for a lineman first class, and for a foreman to effectively supervise line craft work. Answer books are also available.

**T&I-27** *ELECTRONIC TECHNOLOGY, Engineering Technology Series No. 3, PS, 8½ x 11 paperback, 89 pp., 1967, Illinois Board of Vocational Education, 405 Centennial Building, Springfield, IL 62706, or College of Engineering, University of Illinois, Urbana, IL 61801.

This suggested two-year post-high-school program presents course outlines for a six-quarter program on electronic technology. It also includes options for technical electives, and recommendations on equipment needed and lab requirements.

**T&I-28** CAREER PROGRAMS TECHNICAL-VOCATIONAL EDUCATION ILLINOIS PUBLIC JUNIOR COLLEGES, PS, 1970, Illinois Junior College Board, 544 Iles Park Place, Springfield, IL 62703.

Lists technical-vocational programs offered in the State of Illinois. Also covers enrollments in these programs, growth of the programs, and a current summary of Illinois vo-tech programs.

**T&I-29** ELECTRICAL TECHNOLOGY, an in-residence program offered by South Georgia Technical-Vocational School, PS, tuition free, course-cost-loan fund information available from Director of Student Services, South Georgia Technical-Vocational School, Americus, GA 31709.

This two-year program is designed to prepare students for employment in the broad field of electrical power and equipment. Students study mathematics and physics; direct and alternating current fundamentals; technical drawing; vacuum tubes and semiconductors; basic and industrial electronics; installation and planning; and power systems.

**T&I-30** ELECTRICAL APPLIANCE SERVICING, an in-residence program offered by North Georgia Technical-Vocational School, PS, tuition free, course-cost-loan fund information available from Director of Student Services, North Georgia Technical-Vocational School, Clarkesville, GA 30523.

This one-year course in basic theory and principles of electricity includes a firm basis in all phases of the electrical field. Students study the theory of operation of small appliances, and approved trouble-shooting methods and techniques. The major appliances phase of study offers both theory and practical training to enable the graduate to understand, operate, maintain, install and repair all major appliances.

**T&I-31** ELECTRONIC TECHNOLOGY, an in-residence program offered by the South Georgia and North Georgia Technical-Vocational Schools, PS, tuition free, course-cost-loan fund information available from Director of Student Services, South Georgia Technical-Vocational School, Americus, GA 31709, or from Director of Student Services, North Georgia Technical-Vocational School, Clarkesville, GA 30523.

This two-year course prepares students for careers as electronic technicians capable of installing and maintaining all types of industrial electronic equipment. Subjects taught include: communications systems and circuits; transmission and reception of electromagnetic signals; wave propagation and transmission links; transistor electronics; and digital computer fundamentals.

**T&I-32** ELECTRICAL CONSTRUCTION, an in-residence program offered by the South Georgia and North Georgia Technical-Vocational Schools, PS, tuition free, course-cost-loan fund information available from Director of Student Services, South Georgia Technical-Vocational School, Americus, GA 31709, or from Director of Student Services, North Georgia Technical-Vocational School, Clarkesville, GA 30523.

This is a broad, basic, and well-balanced program in practical electricity requiring one year for completion. The student's time is divided among electrical theory, practical laboratory instruction, and job experience. He learns to lay out, assemble, install, and test electrical fixtures, apparatus, control equipment, and light and power systems.

**T&I-33** REFRIGERATION-AIR CONDITIONING, an in-residence program offered by North Georgia Technical-Vocational School, PS, tuition free, course-cost-loan fund information available from Director of Student Services, North Georgia Technical-Vocational School, Clarkesville, GA 30523.

This two-year course prepares students for careers in the refirgeration, air conditioning, and heating industries. Graduates have a thorough knowledge of the principles of heating and cooling. Theoretical and shop training are provided through group and individual instruction in household, commercial, and air conditioning phases of refrigeration and heating.

**T&I-34** ELECTRICIAN, an in-residence program offered by North Georgia Technical-Vocational School, PS, tuition free, course-cost-loan fund information available from Director of Student Services, North Georgia Technical-Vocational School, Clarkesville, GA 30523.

This one-year course is directed toward meeting the need for technically trained employees in the communications, electrical construction, electrical maintenance, and related fields. Students study residential and proper industrial wiring methods and techniques; interpretation of the National Electrical Code and industrial blueprint reading; theory and maintenance of the various types of motors used in industry; and other related topics.

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***Indicates items that are in FEC Library**

T&I-35 RADIO AND TELEVISION REPAIR, an in-residence program offered by the South Georgia and North Georgia Technical-Vocational Schools, PS, tuition free, course-cost-loan fund information available from Director of Student Services, South Georgia Technical-Vocational School, Americus, GA 31709, or from Director of Student Services, North Georgia Technical-Vocational School, Clarkesville, GA 30523.

This 18-month course prepares students for employment in the growing television industry. Students become technicians who can service color and black and white television sets, radio receivers, and stereo-FM equipment. Studies include theory and trouble-shooting on all equipment.

T&I-36 AGRICULTURE, PS, 1967, Curriculum Laboratory, Department of Vocational-Technical Education, Graduate School of Education, Rutgers University, 10 Seminary Place, New Brunswick, NJ 08903.

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| RURAL ELECTRIFICATION–1 | $0.50 |
| RURAL ELECTRIFICATION–2 | 0.75 |
| RURAL ELECTRIFICATION–3 & 4 | 0.75 |

These are curriculum materials for use in a Vocational-Technical and trade industry electrical training program.

T&I-37 ELECTRICAL CONSTRUCTION, Interior wiring, PS, 1967, $1.50 for Student's Manual, $0.50 for Teacher's Key, Instructional Materials, University of Missouri, 8 Industrial Education Building, Columbia, MO 65201.

This study guide is for use in a cooperative training program. It includes an analysis showing what the worker must know, be able to do, and the personality traits essential for success in an occupation involved with interior wiring. It includes assignment sheets containing learning activities, references, and objective type questions for individual study. The Teacher's Key is intended to enable the coordinator to check accurately and quickly the student's work in the classroom.

T&I-38 ELECTRICITY, PS, 1967, Curriculum Laboratory, Department of Vocational-Technical Education, Graduate School of Education, Rutgers University, 10 Seminary Place, New Brunswick, NJ 08903.

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| PROJECTS IN ELECTRICITY–1 | $1.75 |
| EXPERIMENTS IN ELECTRICITY–2 | 1.50 |
| D. C. PRINCIPLES & PROJECTS–3 | 1.50 |
| ALTERNATING CURRENT PROJECTS–4 | 2.00 |
| BASIC ELECTRICITY–THEORY & PRACTICE | 2.00 |
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| PHYSICS FOR ELECTRICAL CONSTRUCTION & MAINTENANCE | 2.50 |

These are curriculum materials for use in a Vocational-Technical and trade and industry electrical training program.

T&I-39 ELECTRICAL APPLIANCE SERVICING, Individual study, PS, 1966, $1.50 for Student's Manual, $0.50 for Teacher's Key, Industrial Materials Laboratory, University of Missouri, 8 Industrial Education Building, Columbia, MO 65201.

This study guide is for use in a cooperative training program. It includes an analysis showing what the worker must know, be able to do, and the personality traits essential for success in an occupation servicing electrical appliances. It includes assignment sheets containing learning activities, references, and objective type questions for individual study. The Teacher's Key is intended to enable the coordinator to check accurately and quickly the student's work in the classroom.

T&I-40 ELECTRICITY AND ELECTRONICS, for General Electric Major Appliance Technicians, S, 8½ x 11, prices available upon request, General Electric Company, 316 Watterson City East, Appliance Park, Louisville, KY 40225.

These self-study programmed texts are designed to orient the student in preparation for formal classroom training.

Course I, 30-2400
- Course I Reference Book
- Book One–Resistors, Lamps, Heaters
- Book Two–Switches and Contacts
- Book Three–Reactors, Solenoids, Relays
- Book Four–Transformers
- Book Five–Fluorescent Lamps and Ballasts
- Book Six–Single-Winding Motors
- Book Seven–Two-Winding Motors
- Book Eight–Capacitors & Capacitor Start Motors
- Book Nine–Multiple-Winding Motors
- Book Ten–Thermal Protectors
- Book Eleven–Wiring Outside the Appliance
- Book Twelve–Measurement for Circuit Faults
- Book Thirteen–Mathematics
- Book Fourteen–Reference Book of Typical Service Manual Information

Course II, 30-2600
- Book One–Series and Parallel Circuits
- Book Two–Meters and Measurements
- Book Three–Power, Heat and Watts
- Book Four–AC Electricity
- Book Five–Current in Coils
- Book Six–Phase Relationships
- Book Seven–Capacitors
- Book Eight–Phase Relationships in Capacitors
- Book Nine–Diode Rectifiers
- Book Ten–Rectifier & Capacitor Applications

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**S–Secondary School (Junior & senior high)**
**PS–Post Secondary School**

Course III, 30-2800 includes solid state component kit

- Book One–Course II Review
- Book Two–Introduction to Semiconductor Diodes
- Book Three–Care and Handling of Semiconductors
- Book Four–Switching Devices and Neon Lamps
- Book Five–Sensors for Heat, Light & Humidity
- Book Six–Controlled Rectifiers: DC Conditions
- Book Seven–Silicon Controlled Rectifiers: AC Conditions
- Book Eight–Full-Wave Control with an SCR
- Book Nine–Control Devices
- Book Ten–The Unijunction Transistor
- Book Eleven–Simple Transistors and Applications
- Book Twelve–The Color Code

**T&I-41 ELECTRICITY AND ELECTRONICS I & II, for General Electric Major Appliance Technicians, PS, prices available upon reqoest, General Electric Company, 316 Watterson City East, Appliance Park, Louisville, KY 40225.**

These are complete instructor's guides for lecture sessions supplementing the self-study texts (30-2400 and 30-2600) complete with background subject materials for instructor's preparation, lesson plan, student response sheets and visual art for overhead projection.

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| Instructor's Manual-Lesson One | 31-7505A |
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| Instructor's Manual-Lesson One | 31-7505A |
| Instructor's Manual-Lesson Two | 31-7505B |
| Instructor's Manual-Lesson Three | 31-7505C |
| Instructor's Manual–Lesson Four | 31-7505D |
| Instructor's Manual–Lesson Five | 31-7505E |
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| Charts–Set of 24 (for Five Lessons) | |

**T&I-42 ELECTRICITY AND ELECTRONICS III, for General Electric Major Appliance Technicians, PS, prices available upon request, General Electric Company, 316 Watterson City East, Appliance Park, Louisville, KY 40225.**

This is a complete instructor's guide for lecture sessions supplementing the self-study text (30-2800) complete with back-ground subject material for instructor's preparation, lesson plan, student response sheets and visual art for overhead projection.

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| Instructor's Manual–Lesson One | 31-7510A |
| Instructor's Manual–Lesson Two | 31-7510B |
| Instructor's Manual–Lesson Three | 31-7510C |
| Instructor's Manual–Lesson Four | 31-7510D |
| Instructor's Manual–Lesson Five | 31-7510E |
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| Charts–Set of 17<br>(covers the Five Lessons) | 31-7510G |
| Classroom Demonstration Kit<br>Components and cicruits for classroom demonstration of behavior of solid state components in typical circuits. | 31-7510H |

*Indicates items that are in FEC Library

**T&I-43 ELECTRICITY & ELECTRONICS FOR AIR CONDITIONING & HEATING TECHNICIANS, S, 8½ x 11, prices available upon request, General Electric Company, 316 Watterson City East, Appliance Park, Louisville, KY 40225.**

These self-study programmed texts are designed to orient the student in preparation for formal classroom training.

Course I, 30-2900

- Book One–Resistors & Heaters
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- Book Three–Reactors, Solenoids, Relays
- Book Four–Transformers
- Book Five–Single-Winding motors
- Book Six–Two-Winding motors
- Book Seven–Capacitors & Capacitor-Start Motors
- Book Eight–Multiple-Winding Motors
- Book Nine–Thermal Protectors
- Book Ten–Power Supply
- Book Eleven–Measurements for Circuit Faults
- Book Twelve–Arithmetic

Course II, 30-3000

- Book One–Series & Parallel Circuits
- Book Two–Meters & Measurements
- Book Three–Power, Heat & Watts
- Book Four–AC Electricity
- Book Five–Current in Coils
- Book Six–Phase Relationships
- Book Seven–Capacitors
- Book Eight–Phase Relationships in Capacitors
- Book Nine–Diode Rectifiers
- Book Ten–Rectifiers and Capacitor Applications

**T&I-44 BASIC REFRIGERATION, 30-2999, S, 8½ x 11, prices available upon request, General Electric Company, 316 Watterson City East, Appliance Park, Louisville, KY 40225.**

These self-study programmed texts are designed to orient the student in preparation for formal classroom training.

- Book One–Heat Energy
- Book Two–Heat Transfer
- Book Three–Pressure
- Book Four–Refrigerants
- Book Five–The Basic Refrigeration System
- Book Six-Refrigerant Charge
  - Dryers
  - Expansion Valves
  - Headers
  - Accumulators
  - Heat Exchangers
- Book Seven–Evaporators
- Book Eight–Condensing Units
- Book Nine–Heat pumps
  - Hot Gas Defrost

T&I-45 BASIC REFRIGERATION, Instructor's Guide, PS, prices available upon request, General Electric Company, 316 Watterson City East, Appliance Park, Louisville, KY 40225.

This complete Instructor's Guide for lecture sessions supplements the self-study texts (30-2999) complete with background subject material for instructor's preparation, lesson plan, student response sheets, and visual art for overhead projection.

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| Instructor's Manual | 31-7565 |
| Student's Manual | 31-7565A |
| Charts—set of 2—T.v.P. Chart, X-Valve Chart | |

T&I-46 CONSUMER ELECTRONICS TRAINING LIBRARY, PS, prices available upon request, General Electric Company, 316 Watterson City East, Appliance Park, Louisville, KY 40225.

Direct Current

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| DC I—Instructor's Manual | 31-7525A |
| DC II—Instructor's Manual | 31-7525B |
| DC III—Instructor's Manual | 31-7525C |
| Charts—Set of 11 | 31-7525G |

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| AC II—Instructor's Manual | 31-7526B |
| AC III—Instructor's Manual | 31-7526C |
| AC IV—Instructor's Manual | 31-7526D |
| Charts—Set of 16 | 31-7526G |

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| Tubes & Circuits I—Instructor's Manual | 31-7527A |
| Tubes & Circuits II—Instructor's Manual | 31-7527B |
| Tubes & Circuits III—Instructor's Manual | 31-7527C |
| Charts—set of 15 | 31-7527G |

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| Semiconductors II—Instructor's Manual | 31-7528B |
| Semiconductors III—Instructor's Manual | 31-7528C |
| Semiconductors IV—Instructor's Manual | 31-7528D |
| Semiconductors V—Instructor's Manual | 31-7528E |
| Charts—Set of 19 | 31-7528G |

**Additional copies of this publication may be ordered from:**

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## 4-H CLUB ELECTRIC PROJECT PROGRAM MATERIALS

(This section only: Educational level evaluation is in terms of B, for Basic; I, for Intermediate; and S, for Senior.)

4H-1 *ALABAMA, Auburn University, Auburn, 36830.

| | |
|---|---|
| YPh- 2 | How Electric Bells Work for You |
| YPh- 3 | How To Buy Nails |
| YPh- 4 | Keep Motors Healthy |
| YPh- 5 | Motors Instead of Muscles |
| YPh-12 | Let's Be Friends with Electricity |
| YPh-13 | Light for Good Grooming |
| YPh-14 | First Aid for Electrical Injuries |
| YPh-15 | Getting Acquainted with Electricity |
| YPh-16 | Rewire a Lamp—Be a Lamp Detective |
| YPh-17 | Saving Steps with switches |
| YPh-18 | Seeing Your Sewing |
| YPh-19 | Which Kind of Wire? |
| YPh-20 | The Electric Iron |
| YPh-21 | Replacing Switches and Outlets |
| YPh-22 | Convenient Controls for Lights |
| YPh-23 | Make a Trouble Light |
| YPh-24 | Ironing Is Fun |
| YPh-25 | Give Your Appliances and Lights a Square Meal |
| YPh-26 | Make a Test Lamp |

4H-2 *ALASKA, University of Alaska, College, 99701.

1st Year Electrical Project, B, 7 Guide Sheet units, 24 pp.
4-H Electric Project Leader's Guide, 1st Year, B, 8 pp.
Electric Project No. 2, B, I, 7 Guide Sheet units, 24 pp.
Electric Project No. 2, Leader's Guide, 8 pp.

4H-3 *ARIZONA, University of Arizona, Tucson, 85721.

Handbook: Electric Project Leaders Guide, requirements, helps, 16 pp.
- Catalog List, kits and materials
- Reference List, experiments, games, puzzles, information
- Guide Sheet List and copies, B, I, S.

4H-4 *ARKANSAS, Agricultural Extension Service, Box 391, Little Rock, 72203.

Electric Workbook, B, I, 24 pp.
Learn About Electricity, Unit 1, B, 8 Guide Sheets, Member's Manual, 32 pp., Leaders Guide, 8 pp.
Using Electricity Wisely, Unit 3, S, 18 Guide Sheets, Member's Manual, 68 pp., Leaders Guide, 18 pp.
Planning For and Using Electricity, S, 24 pp., Leader's Guide, 24 pp.

4H-5 *CALIFORNIA, Agricultural Extension Service, University of California, Berkeley, 94720.

4-H Electric Project Outline, B, I, S, 8 pp.
4-H Electric Project Manual, First Year, B, 16 pp.
4-H Electric Project Manual, Second Year, B, 16 pp.
4-H Electric Project Manual, Third Year, I, 40 pp.
Electric Project Manual, Advanced, S, 4 page fold.
Portable P. A. System, S, 28 pp.

4H-6 *COLORADO, Colorado State University, Fort Collins, 80521

Using 4-H Electric Materials available from the National 4-H Service Committee.

4H-7 *CONNECTICUT, University of Connecticut, Storrs, 06268

Record, 4-H Electric Project, B, single sheet.
Record, 4-H Electric Project, I, S, single sheet.
Electric Motors, Leaders Guide, instruction, information, Guide Sheets, B, I, S, approximately 40 pp.
Fundamentals of Electricity Demonstrations, diagrams, instructions, information, B, I, S, 44 pp.

4H-8 *DELAWARE, University of Delaware, Newark, 19711

Introduction to Electricity, Unit 1, B, 11 Guide Sheets, 52 pp.
Exploring Electricity, Unit 2, I, 10 Guide Sheets, 52 pp.
Suggestions for Third Year Work, S, 4 pp. mimeo.

4H-9 *FLORIDA, University of Florida, Gainesville, 32601

Leader's Guide, 4-H Electric Program, what to do, contests, awards, visual aids, 12 pp.
Program Plans for Leaders, covers programming for eight subjects, B, I, S, 8 pp.
Electric Workbook, Unit 3, I, S, 10 activities, 12 pp.
4-H Electric Project Guide Sheet Set, 17 units, 64 pp.
4-H Club Electricity Record Book, B, I, S, 8 pp.
Fun With Electricity, Unit 1, Book A, B, I, 24 pp.
A Good Reading Lamp, B, I, 4 pp.
Electricity Made Easy, B, I, 20 problems and answers, ranging from repairing cords to meanings of electrical terms and planning wiring, 6 x 9", 16 pp.
Electric Demonstrations Made Easy, B, I, S, script for 2 person teams ranging from tying the electrician's knot to dramatizing voltage drop, 6 x 9, 20 pp.

4H-10 *GEORGIA, University of Georgia, Athens, 30601

4-H Cloverleaf, Engineering Electric, B, 7 lesson units, 24 pp.
4-H Junior, Engineering Electric, I, 7 lesson units, 24 pp.
4-H Senior, Engineering Electric, S, 9 Guide Sheet units, 47 pp.
4-H Engineering—Electronics, I, S, 6 Guide Sheet units, 32 pp.
Learn About Electricity, Unit 1, B, 8 Guide Sheets, Member's Manual, 32 pp., Leader's Guide, 8 pp.
The Hows and Whys of Electricity, Unit 2, I, 11 Guide Sheets, Member's Manual, 40 pp., Leader's Guide, 12 pp.
Using Electricity Wisely, Unit 3, S, 18 Guide Sheets, Member's Manual, 68 pp., Leader's Guide, 18 pp.

4H-11 *HAWAII, University of Hawaii, Honolulu, 96822
4-H Electric Project, Housepower, B, 44 pp., see California
4-H Electric Project, 2nd Year, I, 44 pp. mimeo, see California
4-H Electric Project, 3rd Year, S, 48 pp., see California
Wash Your Duds Party, 4-H Electric Activity, I, S, 12 pp.

4H-12 *IDAHO, University of Idaho, Moscow, 83843

Electricity for the 4-H Scientist:
- Division 1, B, 15 Guide Sheet units, 62 pp.
- Division 2, I, 14 Guide Sheet units, 52 pp.
- Division 3, I, 13 Guide Sheet units, 52 pp.
- Division 4, S, 12 Guide Sheet units, 52 pp.
- Division 6, welding, S, 5 Guide Sheet units, 24 pp.

4H-13 *ILLINOIS, University of Illinois, Urbana, 61801

Electricity Manual and Record Book, 1st Year, B, 12 Guide Sheet units with work sheets and quiz sheets, 52 pp.

Electricity Manual, 2nd Year, I, Guide Sheets and special information sheets, 38 pp.

Electricity Manual, Advanced, S, Guide Sheets and specially prepared material, 52 pp.

Electricity Manual, Supplement—Advanced, S, 12 Guide Sheet sets including welding and electronics, 48 pp.

Illinois 4-H Record, Electricity: 1st Year, B, 12 pp., 2nd Year, I, 4 pp.

Illinois 4-H Electric Activities, I, S, usually one activity each year:
- Learn About Vacuum Cleaners, 8 pp.
- Learn About Small Appliances, 8 pp.
- Good Lighting And You, 8 pp.
- Go For Good Laundry, 12 pp.
- Electric Activity Report Form, single sheet

4H-14 *INDIANA, Purdue University, Lafayette, 47907
Discovering Electricity, Division 1, B, 16 pp.
Learning About Electricity, Division 2, B, 24 pp.
Working With Electricity, Division 3, I, 20 pp.
Using Electricity, Division 4, I, 28 pp.
Electricity Works For You, Advanced Division, S, 12 pp.
Check Sheets For Judging:
- Extension Cord & Trouble Light
- Lamps
- Valance Lighting
- Equipment
- Posters

Awards Program Flyer

4H-15 *IOWA, Iowa State University, Ames, 50010

Leader's Guides are available, as well as the following members kits:
- Unit 1, Understanding Electricity, B, 8 pp.
- Unit 2, Wiring and Circuit Planning, B, I, S, 20 pp.
- Unit 3, Electric Motors, B, I, S, 16 pp.
- Unit 4, Heat, Ventilation, and Refrigeration, I, S, 16 pp.
- Unit 5, Lighting, B, I, S, 6 pp.
- Unit 6, Electronics, I, S, 8 pp.

4H-16 *KANSAS, Kansas State University, Manhattan, 66504

4-H Electric Project, Leader's Guide, comprehensive treatment of the program, 16 pp. printed.

Workbooks with Guide Sheets, each division in three sections:

Experimenting with Electricity, B, Section 1, 28 pp.; 2, 28 pp.; 3, 24 pp.; one sheet Project Record Form; Leader's Guide, 14 pp.

Learning with Electricity, I, Section 1, 32 pp.; 2, 28 pp.; 3, 28 pp.; Advanced Record, 4 pp.; Leader's Guide, 18 pp.

Growing with Electricity, S, Section 1, 32 pp.; 2, 32 pp.; 3, 32 pp.; Advanced Record, 4 pp.; Leader's Guide, 18 pp.

Supplemental Material:
- Advanced Phase—Electronics, 5 Guide Sheets
- Guide Sheet Set
- Judging Suggestions
- Companies Handling Materials, list
- 16 mm Motion Picture Films, list
- Special Sheets: study center, photo cell control, bell alarm for wet basement, power failure alarm, code practice oscillator-amplifier, electronic blinker, and electrical outlet symbols.

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**Educational level code in this 4-H section**

**B—Basic**
**I—Intermediate**
**S—Senior**

4H-17 *KENTUCKY, University of Kentucky, Lexington, 40506

Leader's Guide for the 4-H Electrical Projects, much original work has gone into the preparation of the material, 12 pp.

4-H Electric Project:
- First Year and Record, B, 5 units, 40 pp.
- Second Year and Record, B, 5 units, 32 pp.
- Third Year and Record, I, 6 units, 36 pp.
- Fourth Year and Record, Plan the Light for Your Home, I, 18 pp.

Leaders Guide for 4-H Advanced Electrical Projects, 4 pp.

4-H Electronics and Record, basic information and two exercises, S, 36, pp.

Selection, Care and Use of Your Electrical Appliances, four phases, S, 20 pp.

You Can Learn Advanced Wiring, for three years, S, 48 pp.; Record Book, 20 pp.

Outdoor and Landscape Lighting for Your Farm and Home, S, 16 pp; Record Book, 4 pp.

Let Your Electric Motors Work for You, three years, S, 32 pp.; Record Book, 16 pp.

4H-18 *LOUISIANA, Louisiana State University, Baton Rouge, 70803

Electric Project Workbook, Unit A, 1st and 2nd year, B, 16 Guide Sheet units, 80 pp.

Electric Project Workbook, Unit B, 3rd and 4th year, I, 16 Guide Sheet units, 72 pp.

Electric Project Workbook, Unit C, 5th and 6th year, S, 19 Guide Sheet units, 120 pp.

4H-19 *MAINE, University of Maine, Orono, 04473

4-H Electric Project, three years of work, B, I, 24 pp., plus a set of Guide Sheets.

4-H Electric Project, three years of work, I, S, 45 pp., plus a set of Guide Sheets.

4H-20 *MARYLAND, University of Maryland, College Park, 20742

Leader's Guide, 4-H Electric Project Program, three phases, 17 pp. mimeo.

Mysterious Electricity, 9 Guide Sheet units, 4 supplemental units, B, 28 pp.

Leader's Guide, Mysterious Electricity, B, 20 pp.

More Power to You Revised, 12 Guide Sheet units, I.

Leader's Guide, More Power to You

The Advanced 4-H Electric Club Project, Accompanied by a complete set of Guide Sheets, S, 4 pp.

Project Materials, for youth groups, B, I, S, Edison Electric Institute, see Item AV-3-10.

4-H Electric Project Record, 4 pp.

4H-21 *MASSACHUSETTS, University of Massachusetts, Amherst, 01003

Using 4-H Electric Materials available from the National 4-H Service Committee.

4H-22 *MICHIGAN, Michigan State University, East Lansing, 48823

Beginning Electrical Science, B, Guide Sheets revised with new materials, 40 pp.

Junior Electrical Science, I, Guide Sheets and new material, including science and electronics, well illustrated, 20 units, 66 pp.

Senior Electrical Science, Part 1, Electricity, S, 13 units, much new material, 44 pp.

Senior Electrical Science, Part 2, Electronics, S, 8 units, most all new material, well prepared, illustrated, and related to the practical. Included are a 4-H test circuit, analog computer, volts, amperes, ohms, capacitance, flasher, repulsion coil, inductance, amplifiers, broadcasters, and receivers.

4H-23 *MINNESOTA, University of Minnesota, St. Paul, 55101

4-H Electrical Bulletin:
- Beginner's, B, 17 Guide Sheet units, 66 pp.
- Junior, I, 18 Guide Sheet units, 66 pp.
- Advanced, S, 18 Guide Sheet units, 74 pp.

4H-24 *MISSISSIPPI, Mississippi State University, State College, 39762

4-H Electric Project Leader's Guide, information and instructions covering the entire program, 16 pp.

Electricity Your Helper:
- Book 1, B, I, Two years, 15 Guide Sheet units, 56 pp., Leader's Guide, 15 pp.
- Book 2, I, S, two years, 10 Guide Sheet units, 40 pp.

4-H Club Electric Project Record Sheet, 2 pp.

4H-25 *MISSOURI, University of Missouri, Columbia, 65201

Your 4-H Electric Program, Workbook 3, S, 11 units, much original material, 36 pp.

Leader's Guide, Electricity 3, instructions and information, 4 pp.

Your 4-H Electric Program, Workbook 4, S, 12 units, including Guide Sheets and added material, 20 pp.

Motors Instead of Muscles, TY-173, B, 4 pp.

Keep Your Motors Under Control, TY-197, B, 4 pp.

Successful Soldering, TY-198, B, 4 pp.

References for Technical Information, TY-39, B, 1 p.

4H-26 *MONTANA, Montana State University, Bozeman, 59715

Learn About Electricity, Unit 1, B, 8 Guide Sheets, Member's Manual, 32 pp., Leader's Guide, 8 pp.

Learn About Electricity in the Home, Unit 1-G, B, 10 Guide Sheets, Member's Manual, 36 pp., Leader's Guide, 8 pp.

Learning about Wiring, 4-H Unit B, I, 12 Guide Sheet units, 48 pp.

Learning to Use Electricity, Unit C, S, 19 Guide Sheet units, 84 pp.

Learning to Weld Electrically, Unit D, S, 5 Guide Sheet units, 20 pp.

Learning about Electronics, Unit E, S, 6 Guide Sheet units, 26 pp.

4H-27 *NEBRASKA, University of Nebraska, Lincoln, 68503

Introducing Your 4-H Electric Project, Guide Sheets, 36 pp., Leader's Guide, 10 pp.

Using Electricity, Guide Sheets, 36 pp., Leader's Guide, 10 pp.

Electrical Lighting, Guide Sheets 36 pp., Leader's Guide 10 pp.

Electrical Servants In The Home, Guide Sheets 40 pp., Leader's Guide 10 pp.

Electricity on the Farm or Ranch, Guide Sheets 52 pp., Leader's Guide 10 pp.

Electronics, Guide Sheets 44 pp., Leader's Guide, 10 pp.

4H-28 *NEVADA, University of Nevada, Reno, 89507

Electricity 4-H, 1st year, B, 40 pp., see California.

More Power to You, see California:
2nd year, B, I, 46 pp.

3rd year, I, 50 pp.

4th year, S, 64 pp.

4H-29 *NEW HAMPSHIRE, University of New Hampshire, Durham, 03824

Basic Electricity, Years I and II, B, 17 Guide Sheet units, 56 pp.

Intermediate Electricity, Years III and IV, I, 34 Guide Sheet units, 74 pp.

Advanced Electricity, Years V and VI, S, 39 Guide Sheet units.

Learn About Electricity, Unit 1, B, 8 Guide Sheets, Member's Manual, 32 pp., Leader's Guide, 8 pp.

Learn About Electricity in the Home, Unit 1-G, B, 10 Guide Sheets, Member's Manual, 36 pp., Leader's Guide 10 pp.

The Hows and Whys of Electricity, Unit 2, I, 11 Guide Sheets, Member's Manual, 40 pp., Leader's Guide, 12 pp.

Using Electricity Wisely, Unit 3, S, 18 Guide Sheets, Member's Manual, 68 pp., Leader's Guide, 18 pp.

Electronics for Communications, Unit 5, S, 11 Guide Sheets, Member's Manual, 44 pp., Leader's Guide, 12 pp.

4H-30 *NEW JERSEY, College of Agriculture, New Brunswick, 08903

Electric Project, Unit 1, B, 4 parts, includes quiz sheets, 34 pp.

Leader's Handbook, information and demonstrations, 10 pp.

Electric Project, Unit 2, I, 4 parts, includes quiz sheets, 40 pp.

Leader's Handbook, Unit 2, information and answers, 12 pp. mimeo.

Electric Motors Unit, Advanced Project, S, 7 Guide Sheet units, 28 pp.

Home Wiring Unit, Advanced Project, S. 8 pp.

***Indicates items that are in FEC Library**

Project Record Book, Advanced projects, 4 pp.

Learn About Electricity, Unit 1, B, 8 Guide Sheets, Member's Manual, 32 pp., Leader's Guide, 8 pp.

Learn About Electricity in the Home, Unit 1-G, B, 10 Guide Sheets, Member's Manual, 36 pp., Leader's Guide, 10 pp.

The Hows and Whys of Electricity, Unit 2, I, 11 Guide Sheets, Member's Manual, 40 pp., Leader's Guide, 12 pp.

Using Electricity Wisely, Unit 3, S, 18 Guide Sheets, Member's Manual, 68 pp., Leader's Guide, 18 pp.

Electronics for Communications, Unit 5, S, 11 Guide Sheets, Member's Manual, 44 pp., Leader's Guide, 12 pp.

4H-31 *NEW MEXICO, New Mexico State University, University Park, 88070

Basic Electricity, Years I and II, B, 16 Guide Sheet units, 58 pp.

Intermediate Electricity, Years III and IV, I, 21 Guide Sheet units, 74 pp.

Senior Electricity, Years V and VI, S, 25 Guide Sheet units, 100 pp.

4H-32 *NEW YORK, Cornell University, Ithaca, 14850

Electrical Fundamentals, B, 6 items, 24 pp.

Facts about Fuses and Wires, B, I, 6 items, 24 pp.

Facts about Electric Motors, B, I, 5 Guide Sheet units, 20 pp.

4-H Advanced Electric Manual, S, 5 wiring exercises, 12 pp.

Leader's Guide:
  Electrical Fundamentals, 7 pp.

  Facts about Fuses and Wires, 7 pp.

  Facts about Electric Motors, 5 pp.

  4-H Advanced Electric, 11 pp.

  Learn About Electricity, Unit 1, B, 8 Guide Sheets, Member's Manual, 32 pp., Leader's Guide, 8 pp.

  Learn About Electricity in the Home, Unit 1-G, B, 10 Guide Sheets, Member's Manual, 36 pp., Leader's Guide, 10 pp.

  The Hows and Whys of Electricity, Unit 2, I, 11 Guide Sheets, Member's Manual, 40 pp., Leader's Guide, 20 pp.

  Using Electricity Wisely, Unit 3, S, 18 Guide Sheets, Member's Manual, 68 pp., Leader's Guide, 18 pp.

  Electronics for Communications, Unit 5, S, 11 Guide Sheets, Member's Manual, 44 pp., Leader's Guide, 12 pp.

4H-33 *NORTH CAROLINA, North Carolina State University, Raleigh, 27607

4-H Electric Project 1, B, 14 pp.

4-H Electric Project 2, I, 14 pp.

4-H Electric Project 3, S, 14 pp.

4H-34 *NORTH DAKOTA, North Dakota State University, Fargo, 58102

Electricity Unit A, 10 Guide Sheet units, includes leader information, 42 pp.

Leader's Guide, Unit A, gives detail information for each meeting, 22 pp. mimeo.

Electricity Unit B, I, 11 Guide Sheet units, some revisions, 48 pp.

Leader's Guide, Unit B, gives organization and meeting detail, 24 pp.

Electricity Unit C, 11 Guide Sheet units, some revisions, 48 pp.

4H-35 *OHIO, Ohio State University, Columbus, 43210

Using 4-H Electric materials available from the National 4-H Service Committee.

4H-36 *OKLAHOMA, Oklahoma State University, Stillwater, 74075

Electricity Workbook, Unit 1, based on Guide Sheets, B, 24 pp.

Electric Motors, 4-H Electric Leaflet 1, B, I, 22 pp.

Electric Repairing, 4-H Electric Leaflet 2, I, 6 pp.

Electric Heating, 4-H Electric Leaflet 3, I, S, 14 pp.

Appliance Knowledge, 4-H Electric Leaflet 4, I, S, 10 pp.

Planning for Better Electrical Service, 4-H Electric Leaflet 5, I, S, 14 pp.

4-H Electric Leaflet 7, S, 10 pp.

4H-37 *OREGON, Oregon State University, Corvallis, 97331

Using 4-H Electric materials available from the National 4-H Service Committee.

4H-38 *PENNSYLVANIA, Pennsylvania State University, University Park, 16802

Fun with Electricity, 1st year, B, 8 organized meetings, 54 pp.

Leader's Copy, Fun with Electricity, complete details for each meeting, 56 pp.

Fun with Electricity, 2nd Year, I, 8 organized meetings, 68 pp.

Leader's Copy, Fun with Electricity, 2nd Year, details for each meeting, 72 pp.

Learning About Arc Welding, 4-H Electric, I, S, 24 pp.

You Can Weld Electrically, Leader's Guide, 5 Guide Sheets.

Learning about Electronics, 4-H Electric, S, 6 Guide Sheet units, 32 pp.

4-H Electronics Leader's Guide, 6 Guide Sheets

4H-39 *RHODE ISLAND, University of Rhode Island, Kingston, 02881 Electric Project program, based on Guide Sheets.

Leader's notebook cover, courtesy of electric power suppliers.

4H-40 *SOUTH CAROLINA, Clemson University, Clemson, 29631

4-H Electric Project:
  Unit 1, B, 13 items, Made up from guide sheets with additional information, 55 pp.

  Unit 2, I, 11 items, 39 pp. (National 4-H Electric Literature)

  Unit 3, S, 18 items, 68 pp. (National 4-H Electric Literature)

Electric Welding, for 4-H Electric, S, 5 Guide Sheet units, 20 pp.

4-H Electronics, S, 6 Guide Sheet units, 24 pp.

4H-41 *SOUTH DAKOTA, South Dakota State University, Brookings, 57006

4-H Electric Project:
  Book 1, B, 14 Guide Sheet units, 52 pp.

  Book 2, I, 23 Guide Sheet units, 3 added units, 97 pp.

  Book 3, S, 26 units, a combination of Guide Sheets and revised and new material, 132 pp.

4H-42 *TENNESSEE, University of Tennessee, Box 1071, Knoxville, 37901

4-H Electric Workbook, Division 1, B, 6 Guide Sheet units, 32 pp.

4-H Electric Workbook, Division 2, B, 6 Guide Sheet units, 32 pp.

4-H Electric Workbook, Division 3, I, 6 Guide Sheet units, 32 pp.

4-H Electric Workbook, Division 4, I, 6 Guide Sheet units, 40 pp.

4-H Electric Workbook, Division 5, I, 6 Guide Sheet units, 40 pp.

4-H Electric Workbook, Division 6, S, 6 Guide Sheet units, 36 pp.

4H-43 *TEXAS, Texas A & M University, College Station, 77843

Member Guide, 4-H Electric:
  Unit 1, B, 10 Guide Sheet lessons, 40 pp.

  Unit 2, I, 10 Guide Sheet lessons, 42 pp.

  Unit 3, S, 10 Guide Sheet lessons, 44 pp.

  Soldering and Welding, Member Guide, Unit 4, S, 6 Guide Sheet lessons, 28 pp.

  Motors, Member Guide, Unit 5, I, S, 8 Guide Sheet lessons, 32 pp.

  Electronics, Member Guide, Unit 6, S, 6 Guide Sheet lessons, 28 pp.

  Leader Guide, Electric Project, planning meetings and materials, 9 pp.

  4-H Electric Demonstrations, Member Guide, information and references, 8 pp.

  4-H Electric Demonstrations, Leader Guide, planning and selecting, 8 pp.

  Record Book for 4-H Electric Program, 8 pp., for each unit.

  Guide Sheets are available to supplement workbook lessons.

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*Indicates items that are in FEC Library

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4H-44 *UTAH, Utah State University, Logan, 84321

Exploring Electricity with Sparky, B, much original preparation, 30 pp.

Leader's Guide, 1st year, suggestions and resources, 8 pp.

Exploring Electricity, Phase II, much original material, I, 24 pp.

Exploring Electricity, Phase III, S, Guide Sheets, new material, 36 pp.

Electronics, 4-H Electric advanced, S, 6 Guide Sheet units, 26 pp.

Electric Project, Phase IV, Lighting, S, 1 p. mimeo.

4H-45 *VERMONT, University of Vermont, Burlington, 05401

4-H Electric Club Program uses Guide Sheets, Electric Program Manuals, and Leader's Guides.

4H-46 *VIRGINIA, Virginia Polytechnic Institute, Blacksburg, 24061

Electro 1, 4-H Electric Project, Record Book 67, 25 pp.

Electro 2, 4-H Electric Project, Record Book 69

Electro 3, 4-H Electric Project, Record Book 70

Some Do's and Don'ts for Home Lighting, Circular 495, 4 pp.

First Aid For Electrical Appliances, Circular 606, 6 pp.

195 Topics for 4-H Electric Demonstrations, ME-8, 5 pp.

4H-47 *WASHINGTON, Washington State University, Pullman, 99163

Learn About Electricity, Unit 1, B, 8 Guide Sheets, Member's Manual, 32 pp., Leader's Guide, 8 pp.

Learn About Electricity in the Home, Unit 1-G, B, 10 Guide Sheets, Member's Manual, 36 pp., Leader's Guide, 10 pp.

The Hows and Whys of Electricity, Unit 2, I, 11 Guide Sheets, Member's Manual, 40 pp., Leader's Guide, 12 pp.

Electricity for Better Living, Unit 2-G, I, 8 Guide Sheets, 16 pp.

Using Electricity Wisely, Unit 3, S, 18 Guide Sheets, Member's Manual, 68 pp., Leader's Guide, 18 pp.

Using Electricity in Your Home, Unit 3-G, I, 10 Guide Sheets, 20 pp.

Making Electricity Work for You, Unit 4, S, 17 Guide Sheets, 34 pp.

Electronics for Communications, Unit 5, S, 11 Guide Sheets, Member's Manual, 44 pp., Leader's Guide, 12 pp.

You Can Weld Electrically, Unit 6, S, 5 Guide Sheets, 10 pp.

Learn About Water Sources and Well Construction, Unit 3-I-29, I, 1 Guide Sheet, Member's Manual, 4 pp., Leader's Guide, 1 p.

Fundamentals of the Individual Water System, Unit 2-I-30, I, 1 Guide Sheet, Member's Manual, 4 pp., Leader's Guide, 1 p.

Pumps in the Individual Water System, Unit 3-I-32, I, 1 Guide Sheet, Member's Manual, 4 pp., Leader's Guide, 1 p.

Learn About Centrifugal Jet Pumps, Unit 3-I-32, I, 1 Guide Sheet, Member's Manual, 4 pp., Leader's Guide, 1 p.

Motors Used in the Individual Water System, Unit 3-I-33, I, 1 Guide Sheet, Member's Manual, 4 pp., Leader's Guide, 1 p.

Water Use on the Farm and in the Home, Unit 3-I-34, I, 1 Guide Sheet, Member's Manual, 4 pp., Leader's Guide, 1 p.

Learn How A-C Induction Motors Work, Unit 3-S-38, S, 1 Guide Sheet, Member's Manual, 4 pp., Leader's Guide 2 pp.

Build An A-C Induction Motor, Unit 5-S-39, S, 1 Guide Sheet, Member's Manual, 4 pp., Leader's Guide, 1 p.

Ironing Can Be Easy, Unit 3-B-8, B, 1 Guide Sheet, Member's Manual, 3 pp., Leader's Guide, 1 p.

Know Your Iron, Unit 2-I-3, I, 1 Guide Sheet, Member's Manual, 3 pp., Leader's Guide, 1 p.

The Electric Iron, Unit 4-S-1, S, 1 Guide Sheet, Member's Manual, 4 pp., Leader's Guide, 1 p.

4H-48 *WEST VIRGINIA, West Virginia University, Morgantown, 26506

Learn About Electricity, Unit 1, B, 8 Guide Sheets, Member's Manual, 32 pp., Leader's Guide, 8 pp.

Learn About Electricity in the Home, Unit 1-G, B, 10 Guide Sheets, Member's Manual, 36 pp., Leader's Guide, 10 pp.

The Hows and Whys of Electricity, Unit 2, I, 11 Guide Sheets, Member's Manual, 40 pp., Leader's Guide, 12 pp.

You Can Weld Electrically, Project in 5 parts, each with a Record of Activities, S, 12 pp. each.

4-H Electronics Projects 1 through 6, S, each with a Record of Activities, uses Guide Sheets, 12 pp. each.

4H-49 *WISCONSIN, University of Wisconsin, Madison, 53706

Exploring with Electricity, B, ten things to do, (4 pp. Leader's Guide) 20 pp.

Electricity in the Home, I, S, 32 pp.

The World of Light, mostly S, 16 things to do, (4 pp. Leader's Guide) 30 pp.

Electric Heat and Power, S, 17 things to do, (1 sheet Leader's Guide) 26 pp.

4H-50 *WYOMING, University of Wyoming, Box 3354, University Station, Laramie, 82071

4-H Electric, Basic unit, 15 Lessons, 56 pp., Record Book, 12 pp.

4-H Electric, Intermediate unit, 20 Lessons, 77 pp., Record Book, 18 pp.

4-H Electric, Advanced unit, S, 21 Lessons, 107 pp., Record Book, 8 pp.

Wyoming 4-H Electrical Living Series, I, S:
Getting Acquainted with Electricity, 30 pp.; Leader's Guide, 4 pp.; Record Book, 11 pp.

Electricity and Foods, 13 pp.; Leader's Guide, 22 pp.; Record Book, 13 pp.

Electricity and Clothing, 14 pp.; Leader's Guide, 17 pp.; Record Book, 12 pp.

Lighting, 45 pp.; Leader's Guide, 6 pp.; Record Book, 13 pp.

4H-51 *NATIONAL 4-H SERVICE COMMITTEE, 59 East Van Buren Street, Chicago, IL 60605.

Learn About Electricity, Unit 1, B, 8 Guide Sheets, Member's Manual, 32 pp., Leader's Guide, 8 pp.

Learn About Electricity in the Home, Unit 1-G, B, 10 Guide Sheets, Member's Manual, 36 pp., Leader's Guide, 10 pp.

The Hows and Whys of Electricity, Unit 2, I, 11 Guide Sheets, Member's Manual, 40 pp., Leader's Guide, 12 pp.

Using Electricity Wisely, Unit 3, S, 18 Guide Sheets, Member's Manual, 68 pp., Leader's Guide, 18 pp.

Electronics for Communications, Unit 5, S, 11 Guide Sheets, Member's Manual, 44 pp., Leader's Guide, 12 pp.

Learn About Water Sources and Well Construction, Unit 3-I-29, I, 1 Guide Sheet, Member's Manual, 4 pp., Leader's Guide, 1 p.

Fundamentals of the Individual Water System, Unit 2-I-30, I, 1 Guide Sheet, Member's Manual, 4 pp., Leader's Guide, 1 p.

Pumps in the Individual Water System, Unit 3-I-31, I, 1 Guide Sheet, Member's Manual, 4 pp., Leader's Guide, 1 p.

Learn About Centrifugal Jet Pumps, Unit 3-I-32, I, 1 Guide Sheet, Member's Manual, 4 pp., Leader's Guide, 1 p.

Motors Used in the Individual Water System, Unit 3-I-33, I, 1 Guide Sheet, Member's Manual, 4 pp., Leader's Guide, 1 p.

Water Use on the Farm and in the Home, Unit 3-I-34, I, 1 Guide Sheet, Member's Manual, 4 pp., Leader's Guide, 1 p.

4H-52 *4-H ELECTRIC PROGRAM GUIDE SHEET LIST, a list and classification, National 4-H Service Committee, 59 East Van Buren Street, Chicago, IL 60605.

Guide Sheets are "building blocks" for 4-H member material, available in reproduction proof form, as singles, and as groups (in pre-assembled member books). List indicates which of these have companion Leader's Guides. Also indicates how to order and prices.

4H-53 *4-H ELECTRIC PROGRAM HANDBOOK, 3 ring, 2 inch, hard back binder 11 x 12, approximately 70 pages, $3.00, Westinghouse Electric Corporation, SA9809, c/o National 4-H Service Committee, 59 East Van Buren Street, Chicago, IL 60605.

This handbook was developed by the National 4-H Electric Program Committee to help advance the 4-H Electric Program, and made available by the National Donor, Westinghouse Electric Corporation. It is for use by State and County Extension personnel, cooperating Electric Power Suppliers, State and County 4-H Electric Program chairmen and coordinators.

## VISUAL AIDS, ELECTRIC, ELECTRIFICATION

### Movie Films

AV-1 ELECTRICITY AT WORK, Teaching Series, S, PS, 16 mm., color, sound, 15 minutes, 1964, $150.00 each, Department of Agricultural Engineering, Michigan State University, East Lansing, MI 48823.

These ten teaching films were produced by the University in cooperation with the Michigan Committee on Rural Electrification. For loan arrangements and prices contact T. C. Surbrook. The ten films, each 15 minutes, are as follows:

1. PUTTING ELECTRONS TO WORK—Electricity is a property of the basic particles of all matter. Positive and negative charges, and reaction between these charges are discussed. Other subjects are: structure of atoms, free electrons and their movement, electric current and making use of it, conductors, insulators, and resistance.

2. UNDERSTANDING VOLTS, AMPERES, AND OHMS—The atom, free electrons-electron movement, the dry cell as a force to cause electron flow, fundamental parts of the electric current, electromotive force, using the voltmeter. Other topics are: electron flow, current, ampere and ammeter, electric load, resistance, the ohm and ohmmeter, relationship between volts, amperes, and ohms, and Ohm's Law.

3. USING OHM'S LAW TO UNDERSTAND CIRCUITS—This film covers the three fundamental parts of an electric circuit and applies Ohm's Law. The relationship between voltage, current, and resistance in both series and parallel circuits are shown.

4. WATTS, WATTHOURS, WATTHOUR METERS—It is a discussion of work, power and energy; units of mechanical and electrical power; how to measure power and energy in an electric circuit; how we buy electric power; and how a watthour meter is used to determine wattage of electrical equipment.

5. MECHANICAL GENERATION OF ELECTRICITY—It shows principles of the mechanical generator based on relationships between electricity and magnetism, the magnetic field about a conductor carrying a current, voltage induced in a conductor cutting a magnetic field, alternating voltage and current, single phase, three phase, and voltage and current output of a generator.

6. HOW TRANSFORMERS WORK—The principle of the voltage transformer is based on fundamental relationships between electricity and magnetism which are explained and illustrated. Also discussed are voltage output of a transformer; step up, step down transformers; relationship between power in and power out; and obtaining 120/240 volts from a transformer.

7. THE 120/240 VOLT 3-WIRE SYSTEM—or the distribution of electric energy. It describes transformers, tells how to develop a 120/240 volt 3-wire system, gives the reason for neutral and for grounding, and explains the service entrance switch.

8. UNDERSTANDING BRANCH CIRCUITS—Topics are the 120/240 volt 3-wire system, the transformer, service entrance, branch circuits, fusing, National Electric Code, and grounding appliances. Types of conductors and types of branch circuits are classified, and wiring material and practices are discussed.

9. UNDERSTANDING COMMON INDUCTION MOTORS—After discussion of the importance of electric motors, an explanation and demonstration is given of how induction motors operate. It covers the fundamental parts of induction motors, r.p.m. of a motor, and classification of single phase induction-run motors.

10. STARTING CHARACTERISTICS OF COMMON INDUCTION MOTORS—It shows the main parts of an induction motor, how it operates, rpm, classification according to method of starting, split phase start, capacitor start, repulsion start, connecting motors to lines, dual voltage motors, reversing direction of rotation, measurement of starting torque and current, and makes comparison of the starting characteristics of common single phase induction motors.

AV-2 FARM BETTER ELECTRICALLY, S, PS, 16 mm., color, sound, 27 minutes, $275.00 to EEI members, Sales Division, Edison Electric Institute, 750 Third Avenue, New York, NY 10017.

This film shows up-to-date applications of electricity on actual farms. Information is given on dairy operations; poultry, hog, and beef feeding; freezing and packaging; greenhouses; irrigation; materials handling; farm youth work; experimental installations on research farms; and what is the future of agriculture.

AV-3 PRINCIPLES OF ELECTRICITY, revised and updated, S, PS, 16 mm., color, sound, 20 minutes, $195.00, General Electric Educational Films, 60 Washington Avenue, Schenectady, NY 12305.

This film describes the basic concepts of electrons and electron flow, positive and negative charges, current, voltage, resistance, and fundamental methods of generating electricity. It is a very good film for teaching fundamentals.

AV-4 A IS FOR ATOM, S, PS, 16 mm., color, sound, 15½ minutes, $170.00, General Electric Educational Films, 60 Washington Avenue, Schenectady, NY 12305.

This new revised film describes the nature and properties of the atom, and reflects man's increasing mastery of nuclear technology. It shows today's application of the power of the atom as a servant of mankind.

AV-5 ELECTRICAL SAFETY IN THE HOME, P, S, PS, 16 mm., color, sound, 14 minutes, $150.00, Stout State University, Menomonie, WI 54751.

The object of this film is to alert viewers to common electrical hazards that may exist in homes, and to depict proper means of preventing and correcting such hazards. An inspection sheet is used, and a home is inspected. A teacher's guide and a copy of the inspection sheet may be obtained from the Audio-Visual Center, Stout State University.

AV-6 MY POP'S A LINEMAN, P, S, PS, 16 mm., color, sound, 16 minutes, $150.00, Audio-Visual Center, Stout State University, Menomonie, WI 54751.

The main points of the story are dramatized by flashbacks to portions of famous high voltage demonstrations which present various situations. A typical workday for a lineman, where several dangerous situations are experienced, is shown. Main points such as kite strings in high tension wires, trees and branches that can conduct electricity, shooting at insulators, and what to do when a high voltage line comes in contact with a car are illustrated.

AV-7 OUR WORLD OF ELECTRICITY, series of five films, P, S, 16 mm., sound, color, each 12 minutes and $120.00; B/W $60.00, rental 10% of list price, 1964, Cenco Educational Films, 4401 W. 26th St., Chicago, IL 60623. A teacher's guide accompanies each film.

1. SERIES AND PARALLEL CIRCUITS, Color No. 58885.

This film utilizes a story situation of a boy and his father working on an electric train at home. Dialogue between the two conveys difficulty the boy experiences in wiring the train properly. The film deals with the concepts of circuits, current flow, series and parallel circuits, and fuses. These concepts are applied to circuits in the home and then to correct wiring of the train set.

2. STATIC ELECTRICITY, Color No. 58887.

A boy and girl notice unusual phenomena, such as hair that stands out on dry days, plastic bags clinging to clothing, and receiving electric shock after shuffling across a carpet. Animated artwork explains the laws and principles of positive and negative charges. Terms such as "electrostatic charge" and "induction" are explained and applied.

3. CURRENT ELECTRICITY, Color No. 58889.

This film defines "static" and "current" electricity and illustrates both with the use of familiar scenes of everyday activities. The concept of electric pressure, a source, and circuit is developed. Uses of current electricity and control with a switch are then illustrated. The concept of good and poor conductors, types of materials, and their use is explained with animated artwork. Resistance, short circuits, and fuses are discussed in the final portion of the film.

4. SOURCES OF ELECTRICITY, Color No. 58891.

Batteries, as a chemical source of electricity existing in a number of types, are illustrated, and their operation is explained. The relationship of direct current is established. Alternating current is explained and related to generators as a mechanical source of electricity. Examples and illustrated applications are presented throughout, associating electricity with familiar activities.

5. RADIO AND RADAR, Color No. 58893.

Wireless communication, although fairly recent, plays a vital part in our lives and in our national defense. This film shows how radio waves are produced, and describes their relationship with other electromagnetic waves. Illustration is given of how radio waves travel, differences between AM and FM radio, and the operation of radar in locating and tracking objects in the air.

AV-8 MATTER AND ENERGY (ELECTRICITY) series of three films, P, 16 mm., sound, Encyclopaedia Britannica Educational Corporation, 425 N. Michigan Avenue, Chicago, IL 60611. A Teacher's Guide is included.

1. ELECTROMAGNETS: How They Work, 11 minutes, Color No. 1784 at $135.00; B/W No. 1785 at $70.00.

The film demonstrates that an electromagnetic field is created by the flow of electricity through a conductor, and shows how a simple electromagnet can be constructed. It explains that electromagnets have technological advantages over permanent magnets, that they can be turned on and off, and that they can be strengthened by using a core, extra coils, or more current. Indication is given that there is a relationship between electricity and magnetism.

2. LEARNING ABOUT ELECTRIC CURRENT, 8 minutes, B/W No. 906, $52.50.

This film describes the characteristics, uses, and dangers of electric current. Circuits, conductors, insulators, fuses, and switches are explained both in animation and in simple demonstrations, and the electricity used in the home is traced back to the generators in a power plant.

3. ELECTRICITY AND HOW IT IS MADE, 16 minutes, B/W, $102.50, Color, $200.00.

Illustrates how electricity is produced, what it does, and how it is used to give us light, heat, sound, and power.

AV-9 ELECTRICITY AND MAGNETISM, series of five films, S, 16 mm., Encyclopaedia Britannica Educational Corporation, 425 North Michigan Avenue, Chicago, IL 60611. A teacher's guide is included.

1. ELECTROSTATICS, 11 minutes, B/W, $70.00.

This film demonstrates the basic pheonmena of static electricity, and shows how it can be produced and measured. Includes experiments showing the effects of positive and negative charges.

2. THE PRIMARY CELL, 11 minutes, B/W No. 247, $70.00.

This describes the construction, characteristics, operation, and utilization of primary electric cells. It demonstrates that electricity is a form of energy which may be derived from a form of chemical energy, and that energy can be conveniently transmitted as a flow of electrons. It also shows that electricity from primary cells can be converted to light, heat, and mechanical energy.

3. SERIES AND PARALLEL CIRCUITS, 11 minutes, B/W No. 259, $70.00.

This clarifies the relationships betwen resistance, current, and electromotive force in series circuits and in parallel circuits. It Illustrates these relationships by computing resistance of a toaster and a lamp, and amperage of a soldering iron. It demonstrates the advantages and disadvantages of both types of circuits. It describes a simple series-parallel combination, and offers appropriate examples.

4. VACUUM TUBES, 11 minutes, B/W No. 216 $70.00.

This explains entirely by animated drawings operation of a radio vacuum tube in terms of filament, plate, and grid circuits. It illustrates three functions of the vacuum tube in a radio: how it serves as an amplifier to operate the loud speaker, as a rectifier in detection, and as an oscillator to generate the carrier wave.

5. ELECTRONS, 11 minutes, B/W, $70.00.

The film interprets the hypothesis that electricity consists of unit elementary charges. Demonstrates conduction through solutions, gases, and vacuum. Covers Faraday's laws, valence, movement, charges in vacuum tubes, operation of photoelectric cells, and reproduction of sound on film.

AV-10 ELECTRICITY—DISTRIBUTION, S, PS, 16 mm., color, sound, 16 minutes, FSC-640, rental $6.50, sale $150.00, Audio-Visual Center, Indiana University, Bloomington, IN 47401.

The presentation develops basic concepts of electrical distribution, both cross-country and within the home. Complete distribution system is explained, with demonstrations of "line loss" and the use of fuses for over-load protection. It reviews parallel and series circuitry, and summarizes, using questions.

AV-11 ELECTRICITY—MEASUREMENT, S, PS, 16 mm., color or B/W, sound, 12 minutes. Color, FSC-645, rental $4.00, sale $100.00; B/W, FS-645, rental $2.75, sale $50.00, Audio-Visual Center, Indiana University, Bloomington, IN 47401.

This utilizes simple mock-ups to develop concepts of electrical pressure, current resistance, Ohm's Law and electrical power. Measurement is demonstrated with a battery and lamp circuit. Ohm's Law is used to work the formula: Volts equal Amperes x Ohms. Use of the kilowatt-hour meter as a recorder of electrical power is demonstrated.

AV-12 ELECTRICITY—STATIC ELECTRICITY, P, S, 16 mm., color or B/W, sound, 11 minutes. Color, FSC-1049, rental $4.00, sale $100.00; B/W, FS-1049, rental $2.75, sale $50.00, Audio Visual Center, Indiana University, Bloomington, IN 47401.

This traces the development of man's understanding of static electricity and shows various ways it is used. It reviews basic laws of electrical charges, develops an explanation of lightning and how it can be controlled, depicts harmful effects of static electricity, and illustrates useful applications.

AV-13 ELECTRICITY—PRODUCTION, S, PS, 16 mm., color or B/W, sound, 15 minutes. Color, FSC-1050, rental $6.50, sale $150.00; B/W, FS-1050, rental $4.60, sale $75.00, Audio-Visual Center, Indiana University, Bloomington, IN 47401.

This develops the concept of energy conservation in explaining the basic principles of the generator, storage cell, and primary cell. It shows applications of less well known sources of electrical energy such as photo cells, solar cells, thermocouples, and fuel cells.

AV-14 ELECTRICITY—FROM POWER PLANT TO HOME, P, S, 16 mm., color or B/W, sound, 12 minutes. Color code-402070, sale $140.00; B/W code-402069, $70.00, McGraw-Hill Book Company, 330 West 42nd Street, New York, NY 10036.

A filmed visit to a power plant serves to acquaint the student with the basic facts regarding the generation and distribution of electric power for home use. Animated drawings are used to explain the process of magnetic induction.

AV-15 HOT CORDS CAN BURN, P, S, PS, 16 mm., color, sound, 10½ minutes, 1969, $125.00, National Fire Protection Association, 60 Batterymarch St., Boston, MA 02110.

Cast in story form, this film gives a clear explanation of when and how extension cords should be used, the types needed for special applications, proper care, maintenance, and the consequences of neglect.

AV-16 GIRDLE ROUND THE EARTH, from the History of Science Series, P, S, 16 mm., color, sound, 20 minutes, 1965, $135.00, International Film Bureau, Inc., 332 South Michigan Avenue, Chicago, IL 60604.

Presents applications of the magnetic effects of current-carrying conductors and those pertaining to communication. Starts with the invention and development of the telegraph, telephone, and radio, and continues on to satellite telecommunications.

AV-17 ELECTROMATION IN AGRICULTURE, P, S, PS, 16 mm., color, sound, 27 minutes, 1969, $350.00 to EEI members, $400.00 to non-members, includes packing and shipping charges, Marketing Division, Edison Electric Institute, 750 Third Avenue, New York, NY 10017.

This is a comprehensive film covering all phases of current and potential use of electricity in production agriculture. Film has over 600 outstanding scenes filmed in 22 states on 50 individual locations.

AV-18 THE ELECTRO-MAGNET, P, S, 16 mm., B/W, sound, 15 minutes, 1963, $85.00, International Film Bureau, Inc., 332 South Michigan Avenue, Chicago, IL 60604.

Dealing with the principles and uses of electro-magnets, this film shows production of magnetic fields when electric current is passed through wire, and the effects when a soft iron core and then a steel core are introduced. Shows application of electro-magnets in a magnetic crane, rubbish separator, electric bell, telephone receiver, miscellaneous telephone equipment, and automobile starter motors.

AV-19 PRELUDE TO POWER, From the History of Science Series, S, 16 mm., color, sound, 25 minutes, 1965, $150.00, International Film Bureau, Inc., 332 South Michigan Avenue, Chicago, IL 60604.

Michael Faraday, and his work in the field of electromagnetism during the 19th Century, are the subjects of this film.

AV-20 WIRES TO OUR HOUSE, P, 16 mm., color, sound, 14 minutes, 1961, $165.00, International Film Bureau, Inc., 332 South Michigan Avenue, Chicago, IL 60604.

Explains how the various wires leading into a home are channels for the transmission of power and communication. Shows how power is distributed safely throughout the home.

AV-21 BASIC HOME ELECTRICAL WIRING, S, PS, Super 8 mm., color, silent, 4 minutes each, 1968, $188.00 for complete set of nine cartridged color films with study guides, Eye Gate House, Inc., 146-01 Archer Avenue, Jamaica, NY 11435.

This film series presents a full course on the fundamentals of home electrical wiring. Includes sequences on the installation of convenience outlets and outlet boxes, safety factors, and trouble shooting.

AV-22 THE BUILT-IN BLACKOUT, S, PS, 16 mm., B/W, sound, 49 minutes, 1969, rental $11.25, purchase $210.00, Audio-Visual Center, Indiana University, Bloomington, IN 47401.

Covers the major electrical power failure which blacked out most of the Northeastern United States in November, 1965. Examines the conditions which seem to justify a nation-wide system of regional grids linking the transmission lines of power suppliers to prevent serious blackouts in the future.

AV-23 SO YOU WANT TO BE AN ELECTRONIC TECHNICIAN, S, 16 mm., color, sound, 12 minutes, 1969, Vocational Films, 111 Euclid, Park Ridge, IL 60068.

This film was produced to assist the electronics industry recruit the non-college bound youth. A free, illustrated brochure describing the film is available from the producer upon request.

AV-24 CHARLES PROTEUS STEINMETZ, S, PS, 16 mm., B/W, sound, 10 minutes, $80.00, General Electric Educational Films, 60 Washington Avenue, Schenectady, NY 12305.

Describes the life of the genius who helped lay the foundations of modern electric power systems. Steinmetz made some of the pioneering studies of alternating current, and his methods anticipated today's application of the computer to power systems.

AV-25 HOW THE BOILING WATER REACTOR OPERATES, S, PS, 16 mm., color, sound, 11 minutes, $120.00, General Electric Educational Films, 60 Washington Avenue, Schenectady, NY 12305.

The most successful nuclear reactor used today in generating electric power—the boiling water reactor—is described in this film. Numerous controls and safety devices which have made the BWR a model of safety and economy are fully illustrated.

AV-26 KEEP 'EM PROTECTED, 51FS10300, PS, 16 mm., color, sound, 15 minutes, available on loan, Visual Communications Department, Westinghouse Electric Corporation, Box 2278, 3 Gateway Center, Pittsburgh, PA 15230.

This film demonstrates how the Westinghouse circuit breaker safety system protects machines, man, power, and you. It uses an imaginative combination of techniques—animation, stop motion, etc.—to show circuit breakers in use in homes, industry, and transportation.

AV-27 INDUSTRY'S KEY TO PROGRESS, 65MA12500, PS, 16 mm., color, sound, 17 minutes, available on loan, Visual Communications Department. Westinghouse Electric Corporation, Box 2278, 3 Gateway Center, Pittsburgh, PA 15230.

This film covers the remarkably broad range of industries that are being served by Westinghouse through the computer. Mining, steel, pipeline, paper, manufacturing, and machine tools have all felt the impact and influence of automatic control. Crisply photographed, this film illustrates some of the duties now being handled by computers, and hints at some of the amazing automatic control advances that will be possible in the near future.

AV-28 HERITAGE OF A METER, 65MA14800, PS, 16 mm., color, sound, 20 minutes, available on loan, Visual Communications Department, Westinghouse Electric Corporation, Box 2278, 3 Gateway Center, Pittsburgh, PA 15230.

This unusual film traces the history of a Westinghouse watt-hour meter from raw materials, parts, components, and painstaking quality control to the finished product. Rigorous testing and retesting procedures during every step of assembly demonstrate how quality is built into each meter. The result is a device able to withstand tremendous abuse from environment and the circuit which it meters—a heritage of precision, dependability, and performance.

AV-29 WIDE WORLD OF INDUCTION HEATING, 65RR5500, PS, 16 mm., color, sound, 10 minutes, available on loan, Visual Communications Department, Westinghouse Electric Corporation, Box 2278, 3 Gateway Center, Pittsburgh, PA 15230

Induction heating is now an accepted and practical manufacturing tool. This film illustrates several induction heating applications where the heating equipment is integrated into a production line.

AV-30 WIDE WORLD OF TAKES, 59MA13240, PS, 16 mm., color, sound, 18 minutes, available on loan, Visual Communications Department, Westinghouse Electric Corporation, Box 2278, 3 Gateway Center, Pittsburgh, PA 15230.

This interesting film demonstrates why the turbine generator has been called one of man's most significant accomplishments. The film begins with raw steel and quickly leads the viewer through the exhaustive tooling, testing, research, and analyzing procedures that are necessary to complete one of the most exacting and highly refined machines known to man. Filmed on location coast to coast, it explains how and why turbine generators mean more reliable, more economical electric power, and why the turbine generator is so important to the future of industry.

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**EDUCATIONAL LEVEL CODE**

**P—Primary School (Elementary grades)**
**S—Secondary School (Junior & senior high)**
**PS—Post Secondary School**

AV-31 SILENT SERVANT, S, 16 mm., color, sound, 10 minutes, 1970, purchase and loan details furnished upon request, Photo Department, Public Service Indiana, 1000 E. Main St., Plainfield, IN 46168.

Covers one of the 1969 Blue Ribbon State Fair 4-H Electric demonstrations in Indiana. Miss Pennie Williams of Elwood, Indiana, stars as she explains the many ways in which electric heat can be a "silent servant" around the home and farm. Illustrates how to give a good 4-H Electric demonstration.

AV-32 THE ELECTRICIAN, S, 16 mm., color, sound, 15 minutes, purchase and loan details furnished upon request, National Electrical Contractors Association, 1730 Rhode Island Ave., N.W., Washington, DC 20036.

Directed to those finishing high school and not planning to go on to college, this film is aimed at inducing youth to enter the electric industry's apprenticeship program.

AV-33 MAGNETISM AND ELECTRICITY, S, PS, 16 mm., color or B/W, 17 minutes. Color code 653310, sale $190.00, rental $12.50. B/W code 653210, sale $95.00. McGraw-Hill Films, A Division of McGraw-Hill Book Company, 330 West 42nd Street, New York, NY 10036.

This film demonstrates the relationship between magnetism and electricity. Begins with a review of magnets and their fields, then demonstrates electric currents induced in a conductor. The final sequence also explains the principle of the transformer.

AV-34 FUNDAMENTALS OF A-C AND D-C GENERATION, S, PS, 16 mm., color, sound, 20 minutes, $195.00, General Electric Educational Films, 60 Washington Avenue, Schenectady, NY 12305.

This film reviews the principle of electromagnetic induction and then demonstrates Fleming's right-hand rule to determine voltage and current direction in electric circuits. The film demonstrates the three factors which determine total induced voltage, describes the nature of alternating current, and shows electron flow on a generator and simple circuit. It defines the sine wave, as well as "cycle" and "frequency." Differences between two-pole and four-pole generators are shown, as well as differences between single-phase and three-phase current. D-C power is defined and key elements of generators are shown, with comparisons of A-C and D-C types. (This film is designed to complement Film AV-3, PRINCIPLES OF ELECTRICITY.)

AV-35 THE STORY OF ELECTRICITY—THE GREEKS TO FRANKLIN, P, S, 16 mm., color or B/W, sound, 13½ minutes, with guide, $162.50 color, $81.25 B/W, Coronet Instructional Films, 65 East South Water Street, Chicago, IL 60601.

This film contains re-enactments of key advances in man's knowledge of electricity, told in the discoverers' actual words.

**AV-36 ELECTROMAGNETS, P, S, 16 mm., color or B/W, sound, 11 minutes. Color code 401842, sale $125.00; B/W code 401839, sale $65.00, McGraw-Hill Book Company, 330 West 42nd Street, New York, NY 10036.**

**It explains the theory of electromagnetism by means of simple equipment and demonstrations, and shows how the electromagnet is used in the doorbell, the telegraph, and many other everyday applications.**

**AV-37 JUST PLUG IT IN, S, PS, 16 mm., color, sound, 23½ minutes, $200.00, Bay State Film Productions, Box 129, Springfield, MA 01100.**

**This film effectively presents the case for adequate wiring in the home, with narration by Harold Peary, radio and TV actor.**

**B/W means that the movie films or filmstrips are available in black and white, rather than color.**

## Filmstrips

AV-1-1 *FARM ELECTRIC MOTORS, SELECTION, PROTECTION, AND DRIVES, S, PS, 35 mm., 68 single frames, color, 1964, $9.00, American Association For Vocational Instructional Materials, Coordinator's Office, Engineering Center, Athens, GA 30601.

The illustrations in this filmstrip are from the publication of the same name, Item P-1-5, available from the same source. The discussion deals with single-phase motors, capacities, uses, protection, and connecting.

AV-1-2 *HOW FARM ELECTRIC MOTORS START AND RUN, S, PS, 35 mm., 86 single frames, color, 1964, set $18.00 postpaid, American Association For Vocational Instructional Materials, Coordinator's Office, Engineering Center, Athens, GA 30601.

This gives a very simple presentation dealing with the starting and running principles for different types of single phase motors commonly used on farms. No previous understanding of electricity or magnetism is needed to understand this film. Script is on the film. It was granted a blue ribbon award by ASAE.

AV-1-3 *ELECTRICAL TERMS–THEIR MEANING AND USE, P, S, 35 mm., 89 single frames, color, set $18.00 postpaid, American Association For Vocational Instructional Materials, Coordinator's Office, Engineering Center, Athens, GA 30601.

The visuals are from the publication of the same name, Item P-1, available from the same source. The script is on the film. The discussion deals with terms, practical illustrations, and how electrical energy is purchased. The information is prepared for those who know little or nothing about electricity.

AV-1-4 UNDERSTANDING ELECTRICITY, P, S, 1967, Society for Visual Education, Inc., 1345 Diversey Parkway, Chicago, IL 60614.

Photographs, diagrams, and recorded narration explain and illustrate basic principles of electricity, explore sources, and explain application of this force to modern equipment. Terms related to electricity are emphasized.

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| Each filmstrip with teacher's guide | $6.50 |
| Record for filmstrip 412-1 and 412-2 | 3.50 |
| Record for filmstrip 412-3 and 412-4 | 3.50 |

1. 412-SR Set of 4 filmstrips, 2 back-to-back 33 1/3 rpm records and guides. $31.00.
2. FILMSTRIP WORD GAMES, 4125-WG, Set of 4 (1 for each filmstrip) $4.00.
3. HOW RADIO AND RADAR WORK, 412-1, 59 frames, 14 minutes.
This tells how radio waves are produced and how they travel, shows function of transmitter and receiver, and explains radar.
4. HOW ELECTRICITY IS PRODUCED, 412-1, 61 frames, 14 minutes.
It shows how generators and batteries differ; also, shows producing electricity by piezoelectric, photoelectric, and thermoelectric effects.
5. PRODUCING STATIC ELECTRICITY, 412-3, 59 frames, 13 minutes.
This shows how materials become positively or negatively charged, and explains why electricity charged objects repel or attract.
6. ELECTRIC CIRCUITS AND HOW THEY WORK, 412-4, 58 frames, 12½ minutes.
It explains steps necessary to form a circuit. It shows difference in parallel and series circuits, and tells why a fuse blows.

AV-1-5 *ELECTRICAL CIRCUITS, S, 57 frames, color, 1966, $6.00, catalog No. 482-6, (filmstrip with captions,) Society for Visual Education, 1345 Diversey Avenue, Chicago, IL 60614

Circuits in general are described; also, series, parallel, and series-parallel circuits. Ohm's law of resistance is explained, and terms defined.

AV-1-6 *THE PRINCIPLES OF ELECTRIC MOTORS AND GENERATORS, S, 68 frames, color, 1966, $6.00, catalog No. 482-7, filmstrip with captions, Society for Visual Education, 1345 Diversey Avenue, Chicago, IL 60614

In this filmstrip with captions, laws of electro-magnetism are discussed. AC and DC motors and generators are included, and also questions.

AV-1-7 DIAGRAMMING ELECTRICAL WIRING CIRCUITS (401-65), S, PS, 54 frames, B/W, single-frame slidefilm, $1.30 plus postage, Vocational Agriculture Service, 434 Mumford Hall, University of Illinois, Urbana, IL 61801

This slidefilm discusses planning electrical circuits, diagramming the circuits, and the use of standard symbols. Standard symbols make neater diagrams that are easier to check. Simple rules for wiring in cable and conduit are given.

**EDUCATIONAL LEVEL CODE**

**P–Primary School (Elementary grades)**
**S–Secondary School (Junior & senior high)**
**PS–Post Secondary School**

**AV-1-8 IDENTIFYING ELECTRICAL WIRING MATERIALS (404A), S, PS, 68 single-frame slidefilm, B/W, $1.35 plus postage, Vocational Agriculture Service, 434 Mumford Hall, University of Illinois, Urbana, IL 61801.**

This slidefilm is useful when unpacking and checking items contained in received shipments. It is also helpful in teaching identification of commonly used electrical items. It was prepared for use with the Illinois Vo-Ag Service Electrical Loan Box.

**AV–1-9 ELECTRIC WELDING, LEARNING AND APPLICATION, S, PS, single frame slidefilms, Vocational Agriculture Service, 434 Mumford Hall, University of Illinois, Urbana, IL 61801.**

LEARNING ARC WELDING SKILLS I (450-64) 45 frames, color
LEARNING ARC WELDING SKILLS II (451-64) 63 frames, color
LEARNING ARC WELDING SKILLS III (452-64) 34 frames, color
Set of three, $5.00 plus postage.

The first film describes the equipment used in arc welding and safety precautions to follow. The second film tells how to strike and hold the arc, run beads, and how to make downhand, fillet, lap, and corner welds. The third film tells how to make out-of-position welds.

1. WELDING CAST IRON WITH ARC WELDER (457) 47 frames, B/W, $1.15 f.o.b. Urbana, Ill.

Three types of cast iron are discussed and the spark test for identifying the metal is explained. A detailed procedure for preparing the metal is illustrated. Complete instructions are given for the actual welding process. Information is provided to prevent cracking, overheating, etc., to solve typical problems in welding cast iron.

2. HARDSURFACING FARM EQUIPMENT WITH THE ARC WELDER (458) 36 frames, B/W, $1.00 f.o.b. Urbana.

The important differences between abrasion and impact are explained as they relate to agricultural and soil tillage tools. The work hardening features of certain materials are explained and the use of chromium carbide material on soil tillage tools is illustrated. The use of powder with the carbon arc torch on thin tools and electrodes on thicker tools is explained in detail.

3. HEATING, BRAZING, SOLDERING AND CUTTING WITH ARC WELDING EQUIPMENT (459) 39 frames, B/W, $1.05 f.o.b. Urbana, Ill.

Illustrations and instructions are given for operating the carbon arc torch for heating and bending. Brazing can be done with either the carbon torch or one carbon and the electrode holder. Soldering can be done with one carbon, with carbon arc torch or soldering irons can be heated with the torch. Cutting metal and piercing hole with mild steel electrode is illustrated.

**AV-1-10 DC AND AC MOTOR THEORY, TESTING, CONNECTING, AND TROUBLE SHOOTING, S, PS, four single frame B/W slidefilms, set of 4 films $4.25 f.o.b. Urbana, Vocational Agriculture Service, 434 Mumford Hall, University of Illinois, Urbana, IL 61801.**

1. MAGNETISM AND THE DC MOTOR (Part 1) 31 frames, $0.95 f.o.b. Urbana, Ill.

The subject of magnetism, its uses and principles are presented. Several shop demonstrations of applications of magnetism and electricity are illustrated. The operating principles of the DC motor are explained.

2. INDUCTION AND THE AC MOTOR (Part 2) 33 frames, $0.95 f.o.b. Urbana, Ill.

Alternating current is first introduced and explained. The AC electromagnet "growler" is explained. Schematic drawings are used to illustrate how the AC motor runs by induced current. The starting winding and starting switches used in the split-phase, capacitor and repulsion-induction motor are illustrated. There is also a discussion of the universal motor.

3. TESTING AND IDENTIFYING LEADS, CONNECTING AND REVERSING (Part 3) 36 frames, $1.00 f.o.b. Urbana, Ill.

An explanation of the makeup of an AC and a DC Test Set is given. This includes the use of the DC voltmeter and the AC voltmeter and ammeter. The identification of the leads extending from the motor windings is explained by using the two test sets. The identifications are explained for the split phase, capacitor and repulsion-induction motors. The procedure for reversing each of these motors is explained.

4. TROUBLE SHOOTING (Part 4) 61 frames, Code No. 2018, $1.35 f.o.b. Urbana, Ill.

Troubles with electric motors are divided into three categories: completely dead, hums but will not start, and runs unevenly or heats excessively. A systematic analysis procedure is outlined to locate motor troubles that have the above listed symptoms.

**AV-1-11 NEW LIGHT FOR YOUR HOME, 0465P, S, PS, 53 frames, color, $6.00, NASCO, Fort Atkinson, WI 53538.**

Covers requirements of good lighting, types of lighting, fixtures for general lighting, local lighting, and planning home lighting. Teacher's lecture guide is included. Prepared by the Virginia Department of Education, General Electric Company, and Appalachian Power Company.

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Additional copies of this publication may be ordered from:

Farm Electrification Council
Box 1008, Oak Brook, IL 60523

**AV-1-12 CURRENT FACTS**, S, 90 frames, color, sound, 16 minutes, 1969, 1-6 copies $10.00 each, 7-49 copies $8.50 each, 50 or more copies $7.50 each, Admaster, Inc., 425 Park Avenue South, New York, NY 10016.

Takes a novel approach to explaining shock hazard by using the theme "Don't make yourself a pathway to the ground." Starts off by explaining the basic electrical circuit in unusual diagram form, emphasizing the common use of grounding. Then, it shows how defective wiring and appliances make one a pathway to the ground, completing the circuit—the wrong way.

**AV-1-13 FOUR FIRSTS OF MOTOR MAINTENANCE**, 58FS11041575, PS, color, 15 minutes, $39.00 as a package offer with companion filmstrip "Ten Checks of Electrical Control Maintenance", Visual Communications Department, Westinghouse Electric Corporation, Box 2278, 3 Gateway Center, Pittsburgh, PA 15230.

Illustrates the four principle causes of motor breakdowns, and tells how to prevent them. Photographs, supplemented by drawings, show the results of neglect and faulty maintenance, and illustrate corrective action.

**AV-1-14 TEN CHECK POINTS OF ELECTRICAL CONTROL MAINTENANCE**, 58FS11051575, PS, B/W, 15 minutes, $39.00 as a package offer with companion filmstrip "Four Firsts of Motor Maintenance", Visual Communications Department, Westinghouse Electric Corporation, Box 2278, 3 Gateway Center, Pittsburgh, PA 15230.

Illustrates the proper care and maintenance of electrical control apparatus used in industry. Graphically illustrates inspection illustrates inspection methods, servicing, and adjustments, along with views of the apparatus before, during, and after servicing.

**AV-1-15 THE ELECTRIC CURRENT**, from Basic Electrical Principles series, S, 52 frames, color, 17 minutes, 1970, $11.00 with record, $13.00 with cassette, Society For Visual Education, Inc., 1345 Diversey Parkway, Chicago, IL 60614.

Covers pioneering work of Galvani and Volta in the development of the voltaic cell. Tells how the voltaic cell causes electric current, or electron stream, to flow through a circuit. Defines coulomb, ampere, volt.

**AV-1-16 OHM'S LAW OF ELECTRICAL RESISTANCE**, from Basic Electrical Principles series, S, 55 frames, color, 13 minutes, 1970, $11.00 with record, $13.00 with cassette, Society For Visual Education, Inc., 1345 Diversey Parkway, Chicago, IL 60614.

Demonstrates the action of a resistor. Derives Ohm's Law from an analysis of how resistor current changes with different values of applied voltage. Covers applications of Ohm's Law.

**AV-1-17 ELECTRICAL WORK, ENERGY, AND POWER**, from Basic Electrical Principles series, S, 47 frames, color, 13 minutes, 1970, $11.00 with record, $13.00 with cassette, Society For Visual Education, Inc., 1345 Diversey Parkway, Chicago, IL 60614.

Discusses work, energy, and power in mechanical terms, and terms of application to electrical situations. Defines watt and kilowatthour. Tells how power is calculated from voltage and amperage.

**AV-1-18 DIRECT-CURRENT MEASURING INSTRUMENTS**, from Basic Electrical Principles series, S, 49 frames, color, 14 minutes, 1970, $11.00 with record, $13.00 with cassette, Society For Visual Education, Inc., 1345 Diversey Parkway, Chicago, IL 60614.

Explains development of the d'Arsonval galvanometer and tells how series and shunt resistors convert such movements to measure various ranges of current and voltage.

**AV-1-19 SEMICONDUCTORS IN ACTION**, 65FS11211250, PS, 35 mm., color, 20 minutes, available on loan, Visual Communications Department, Westinghouse Electric Corporation, Box 2278, 3 Gateway Center, Pittsburgh, PA 15230.

Semiconductors and solid state technology have had a tremendous impact in the fields of electronics and electrical processes. This filmstrip illustrates what semiconductors are, how they work, and how they are used in some typical industrial applications.

**AV-1-20 SILICON POWER SEMICONDUCTORS**, 65FS11221250, PS, 35 mm., color, 20 minutes, available on loan, Visual Communications Department, Westinghouse Electric Corporation, Box 2278, 3 Gateway Center, Pittsburgh, PA 15230.

Contains the same information on rectifiers and silicon control rectifiers as the previous filmstrip, but includes additional information on the transistor family. It's a more generalized filmstrip and is recommended for a broader audience group.

AV-1-21 ACADEMY OF LIGHTING ARTS, sound slidefilm series, S, PS, color, Large Lamp Department, General Electric Company, Nela Park, Cleveland, OH 44112.

The following slidefilms are excellent for training of new employees, for meetings with designers, architects, contractors, and builders. The films are designed to be used with the automatic Audio Visual projector such as the Dukane. Those films marked with an asterisk (*) may be used successfully with lay audiences.

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| *LIGHT FOR LIVING | 25 minutes | $10.00 |
| LIGHT FOR EASY SEEING | 22 minutes | 10.00 |
| *LIGHTING FOR COMFORT | 20 minutes | 10.00 |
| INCANDESCENT LIGHT SOURCE FOR THE HOME | 27 minutes | 10.00 |
| FLUORESCENT LIGHT SOURCES FOR THE HOME | 13 minutes | 10.00 |
| *FIXTURES | 26 minutes | 10.00 |
| *PORTABLE LAMPS | 20 minutes | 10.00 |

AV-1-22 ELECTRICITY, P. S, 47 frames, color, seven sets in this series, $42.00 series, $6.00 set, Encyclopedia Britannica Corp., 425 North Michigan Avenue, Chicago, IL 60611.

This series answers questions such as: What are electrically charged objects? What are insulators and conductors? How do batteries provide electricity? How do we obtain heat and light from electric current?

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*Indicates items that are in FEC Library

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Additional copies of this publication may be ordered from:

Farm Electrification Council
Box 1008, Oak Brook, IL 60523

Single copy prices

| | |
|---|---|
| FEC members | $2.50 |
| Non-members of FEC | .3.75 |
| National & State educators | Free, upon request |

Quantity prices

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| 1-10 copies | $2.50 each |
| 11-49 copies | 2.00 each |
| 50 or more copies | 1.50 each |

Non-members of FEC add 30% to these quantity prices.

A&B CORPORATION
Audio-Visual Department

AV-2-1 *THE ELECTRIFICATION FARM STORY, series of six slide sets, S, PS, color, 2 x 2 slides, 1965, price upon request, Edison Electric Institute, 750 Third Avenue, New York, NY 10017.

The farm story is presented in a series of six subjects: dairy, beef, swine, materials handling, poultry, and miscellaneous applications. Each set is in a vinyl binder with slide holders inserted and caption sheets explaining each slide.

AV-2-2 ELECTRICITY FOR HOME USE, S, PS, 31 color slides, 2 x 2, $6.00 per set, Cooperative Extension Service, North Dakota State University, Fargo, North Dakota 58102.

The slide set and script presents the need for adequate farm wiring, and what is involved in planning and having an adequate wiring installation.

AV-2-3 MILK HOUSE SCORE CARD, S, PS, 34 slides, 2 x 2, and script, $5.50 per set, Frank Anthony, Department of Agricultural Education, 101 Agricultural Education Building, Pennsylvania State University, University Park, PA 16802

This slide set gives a good vocational agriculture field exercise teaching example in full detail. Complete information for a milkhouse is given, and the score card is to be completed by the students.

AV-2-4 THE WHY OF 4-H DEMONSTRATIONS, P, S, PS, 2 x 2 slides, taped commentary and script, $15.00 per set, Everett S. Lusk, East Kentucky Rural Electric Cooperative Corporation, Box 707, Winchester, KY 40391.

Shows electrical demonstration projects created by Kentucky 4-H members. Produced by the Kentucky Youth Electrical Council.

AV-2-5 *WHAT IS YOUR C-A-S-E WITH ELECTRICITY?, S, PS, 44 color slides, 2 x 2, and script, $6.50 per set, Frank Anthony, Department of Education, 101 Agricultural Education Building, The Pennsylvania State University, University Park, PA 16802.

This presentation discusses convenience, adequacy, safety, and efficiency in the use of electricity. A score card is used by the students. A pack of fifty score cards costs $1.00.

AV-2-6 HOW ELECTRICITY PERFORMS, S, PS, 6 sets 2 x 2 color slides, each with a script. For information, write to T. C. Surbrook, Agricultural Engineering Department, Michigan State University, East Lansing, MI 48823.

1. PUTTING ELECTRONS TO WORK, 19 colored slides, $7.00

Principles of electricity, such as the atom, its electrons, effects of opposite and like charges, electron movement, electric current, electromotive force, and instruments for measuring amperes, volts, and ohms, are discussed.

2. MECHANICAL GENERATION OF POWER, 34 colored slides, $12.00.

The generation of alternating current is illustrated. Two fundamental relations between electricity and magnetism are shown to be the basic principles of the mechanical generator. A conductor shaped as a loop is revolved in a magnetic field of a "mock-up" generator to show, step by step, how an alternating voltage is produced. Cycle, frequency, phase, voltage current relationship, and three-phase voltage are explained and illustrated.

3. WHY A VOLTAGE TRANSFORMER WORKS, 17 colored slides and script, $6.00

The existence of a magnetic field around a current carrying conductor is illustrated and discussed, including a strong magnetic field, solenoid, transformer design, induced voltage, and windings.

4. SINGLE PHASE INDUCTION MOTORS: COMMON TYPES AND THEIR DIFFERENCES, 17 slides, mostly colored, $10.00.

Discussed and illustrated are the parts of the induction motor, why it is called an induction motor, the four common single-phase types, how they start and run, reversing direction, and dual voltage motor.

5. CONNECTING AND REVERSING COMMON ELECTRIC MOTORS, 30 colored slides, $11.00.

This set illustrated the simplicity of single phase induction run motors, what makes them run, and auxiliary starting devices; also, how to use motor name plate information to construct schematic drawings of motor circuits, how to trace motor circuits, how to connect motors to the line, and how to reverse them.

6. WHY OUR ELECTRIC WIRING IS SAFE, 31 non-technical colored slides, $11.00.

These slides illustrate how electric wiring systems, from the transformer to the outlets in a building, are designed to be safe. Why and how our wiring systems are grounded is fully illustrated.

**All materials are 8½ x 11, unless indicated otherwise.**

AV-2-7 *WIRING FOR YOUR HOME, S, PS, 42 slides, 2 x 2, and script, $8.00, Division of Photography, Office of Information, USDA, Washington, DC 20250.

The slides show the importance of adequate wiring, fusing, and circuits within the home. Fundamental electrical terms are explained. This set is one of a series prepared by the Housing section of the Southern Region Plan Exchange Committee with the Federal Extension Service.

AV-2-8 MAGNETISM AND ELECTRICITY, overhead transparencies, P, S, color, each with teaching guide with suggestions for presentation and use, Instructo Corporation, Paoli, PA 19301.

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| No. 824-1 | FIELDS OF FORCE, 5 overlays | $4.95 |
| No. 824-2 | DRY CELL AND CIRCUIT<br>3 overlays, 3 masks | 4.95 |
| No. 824-3 | ELECTRIC BELL, 1 overlay | 3.95 |
| No. 824-4 | SHORT CIRCUITS<br>3 overlays, 3 masks | 4.95 |
| No. 824-5 | SERIES & PARALLEL CIRCUITS,<br>4 overlays, 1 mask | 4.95 |
| No. 824-B | Complete series of 5 above | 22.95 |

AV-2-9 THE THIRD AGE OF LIGHT, P, S, PS, 45 color slides, 2 x 2, and script, $22.50 per set, $5.00 per set minimum rental fee for two weeks, Large Lamp Department, General Electric Company, Nela Park, Cleveland, OH 44112.

Begins with Edison's invention which triggered the First Age of Light; continues on with the fluorescent which was the beginning of the Second Age of Light; and closes with an analysis of the Third Age of Light which will be brought on by the rapid and radical developments in source technology and lighting technique that are now taking place. This is a general interest, non-technical slide lecture.

AV-2-10 INCANDESCENT LAMPS, TP-110, S, PS, 29 color slides, 2 x 2, $14.50 per set, $5.00 per set minimum rental fee for two weeks, Large Lamp Department, General Electric Company, Nela Park, Cleveland, OH 44112.

Basic lamp parts, how lamps are made, types of filaments, bulbs, bases and filling gas are discussed in this slide lecture. Also describes general classes of lamps and operating characteristics.

AV-2-11 FLUORESCENT LAMPS, TP-111, S, PS, 36 color slides, 2 x 2, $18.00 per set, $5.00 per set minimum rental fee for two weeks, Large Lamp Department, General Electric Company, Nela Park, Cleveland, OH 44112.

Presents a thorough but concise coverage of lamp parts and operation, phosphor materials and spectral data, classes of lamps, basic lamp systems, ballasts, and other lamp characteristics.

AV-2-12 HIGH INTENSITY DISCHARGE LAMPS, TP-109, S, PS, 24 color slides, 2 x 2, $12.00 per set, $5.00 per set minimum rental fee for two weeks, Large Lamp Department, General Electric Company, Nela Park, Cleveland, OH 44112.

Covers bulb shapes and sizes, operating characteristics and performance features of the Mercury, Multi-Vapor, and Lucalox lamps.

AV-2-13 HISTORY OF LIGHT SOURCES, P, S, 28 color slides, 2 x 2, and script, $14.00 per set, $5.00 per set minimum rental fee for two weeks, Large Lamp Department, General Electric Company, Nela Park, Cleveland, OH 44112.

Discusses the history of light sources from the ancient civilizations of Babylonia and Egypt to today's modern classrooms.

AV-2-14 INTERIOR LIGHTING, series of slide lectures, S. PS, color, 2 x 2 slides, $5.00 per set minimum rental fee for two weeks, Large Lamp Department, General Electric Company, Nela Park, Cleveland, OH 44112.

1. FUNDAMENTAL CONCEPTS, 20 slides and script, $10.00.

This is a training lecture for educators and those who sell and specify interior lighting equipment.

2. HOME OF LIVING LIGHT, 31 slides and script, $15.50.

Tells the story of a $60,000 home designed for "Practical Builder" magazine and built in Cleveland, Ohio. Contains many examples of recessed, structural and luminous area lighting applications.

3. LIGHT MAKES THE DIFFERENCE SERIES

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| BATHROOM LIGHTING<br>27 slides & script | $13.50 |
| BEDROOM DARKNESS<br>26 slides & script . | 13.00 |
| FAMILY ROOMS 27 slides & script | 13.50 |
| KITCHENS 39 slides & script | 19.50 |
| LIVING/DINING ROOMS<br>43 slides & script | 21.50 |
| OUTDOOR LIVING 37 slides & script | 18.50 |

4. LIVE BETTER WITH LIGHT FOR LIVING, 36 slides and script, $18.00.

A general discussion covering the benefits and objectives of today's recommended practices. Touches on decorative and outdoor lighting.

5. LOW VOLTAGE LIGHTING–INDOOR AND OUT, 52 slides and script, $26.00.

Suggests techniques for the use of low voltage lighting equipment. Charts show light output and distribution.

6. MODERN LIGHTING IN A TRADITIONAL HOME, 11 slides and script, $5.50.

Discusses a sensible deployment of built-in concealed lighting in the living room and family room.

7. RESIDENTIAL LIGHTING CENTER, LIGHT–Vol. 1, 26 slides, no script, $13.00.

This slide set is a pictorial review of the residential area in the General Electric Lighting Institute, Nela Park.

8. RESIDENTIAL STRUCTURAL LIGHTING, TP-107, 37 slides, no script, $18.50.

Shows installation of valances, cornices and wall brackets, accompanied by "how to" details.

9. STUDY LIGHTING, 25 slides and script, $12.50.

Gives fundamentals of seeing pertaining to study lighting, and the pros and cons of the various equipment on the market.

10. THE LIGHT BOOK, 261-8260, 33 slides, no script, $16.50.

This set shows lighting distribution and recommended placement of the many types of equipment used in the home.

11. REMODELING SERIES

100-YEAR-OLD HOUSE 18 slides & script $9.00
Describes the before and after remodeling and relighting.
70-YEAR-OLD HOUSE 12 slides & script 6.00
Remodeled home in the older section of a typical city.
40-YEAR-OLD HOUSE 20 slides & script 10.00
Before and after modernization of a fire-damaged home.

70-YEAR-OLD HOUSE 12 slides & script

AV-2-15 EXTERIOR/LANDSCARE LIGHTING, series of slide lectures, S, PS, color, 2 x 2 slides, $5.00 per set minimum rental fee for two weeks, Large Lamp Department, General Electric Company, Nela Park, Cleveland, OH 44112.

1. DRAMA ON SUB-LOT 82, 22 slides and script, $11.00.

Tells how the benefits of light—for living outdoors can be enjoyed even on a small city lot.

2. KEYS TO MORE BEAUTIFUL AND LIVABLE HOME GROUNDS, 33 slides and script, $16.50.

Prepared for use with garden clubs or civic organizations. Contains notes on ideas for demonstrations, study references, equipment, costs, and how to adapt material to various speaking-times.

3. LANDSCAPE LIGHTING, TP-132, 96 slides, no script, $48.00, or $0.50 per slide.

Shows how to capture the subtle qualities of lighting, how to use color, and many other ways to make the outside of the home more attractive, safer, and a fun place to be and see.

AV-2-16 PLANNING THE FARM ELECTRIC WATER SYSTEM, O1338P, S, PS, 17 B/W slides, 2 x 2, $5.45 per set, NASCO, Fort Atkinson, WI 53538.

Presents styles of pumps, farmstead water distribution system, farmhouse piping layout as well as bathroom and kitchen layouts.

AV-2-17 ELECTRO-HORTICULTURE, S, PS, 40 color slides, 2 x 2, and script, $35.00 per set, Engineered Environments, Inc., Box 355, Sterling, MA 01510.

Covers the use of electricity for the small commercial and hobby horticulturist. Includes information on the application of ventilation, cooling, heating, lighting, watering, and materials handling.

AV-2-18 ELECTRICITY/BASIC ELECTRONICS, overhead transparencies, S, PS, color, includes teacher's guide, Series No. 104, 179 overlays, $633.55 for complete series, or transparencies may be purchased individually, DCA Educational Products, Inc., 4865 Stenton Avenue, Philadelphia, PA 19144.

This series, consisting of 14 separate sections, begins with simple electrical theory and progresses to semiconductors, transistors, vacuum tubes, and radar. It illustrates important electrical laws. Major sections cover: electrostatics; voltage sources; fundamental electrical principles; electrolysis; magnetism and electromagnetism; machines; inductance; meters; alternating currents; vacuum tube fundamentals; semiconductors and transistors; vacuum tube applications; special purpose tubes; and antennas/electronic systems.

AV-2-19 RESIDENTIAL ELECTRICAL WIRING, overhead transparencies, S, PS, color, includes teacher's guide, Series No. 14, DCA Educational Products, Inc., 4865 Stenton Avenue, Philadelphia, PA 19144.

Covers circuit layouts for each room or area in a typical single residence dwelling.

AV-2-20 ELECTRICITY SERIES, Transparencies For The Overhead Projector, S, PS, NASCO, Fort Atkinson, WI 53538.

1. BATTERIES, OT240-9, Base and 1 overlay, $3.00.

Illustrates all three types of cells. Cut-away view of storage battery shows separators and plates. Cross section of dry cell shows central annode of Maganese Oxide and powdered carbon, zinc cathode casing, and filler of ammonium and zinc chlorides. Overlay completes external circuit of dry cell, and describes voltaic cell in detail.

2. SYMOBLS, OT241-6, Base only, $1.50.

Shows a sampling of the most common symbols used in electrical work.

3. CIRCUITS, OT242-7, Base and 2 overlays, $3.00.

Illustrates series and parallel circuits. Base and overlays demonstrate how voltage is developed. Three dry cells and three lamps are used for illustrative purposes.

4. TRANSFORMERS, OT243-8, Base and 1 overlay, $2.25.

The base transparency and the overlay dramatically illustrate the step-up transformer and the step-down transformer. Simple methods of computing primary and secondary voltages are a logical follow-up.

5. GENERATOR PLANT–POWER TRANSMISSION, OT244-1, Base and 1 overlay, $2.25.

Shows how current is generated at 6,600 volts, stepped up for transmission, then stepped down for home use.

6. GENERATOR, OT245-4, Base and 2 overlays, $3.00.

The base transparency shows the generation of an electric current when a coil of wire rotates through magnetic fields, and this generator is hooked up to a galvanometer to measure the amount and direction of the current flow. The first overlay shows the positive current picked up by the top coil, and the measurement of its magnitude and direction. The second overlay, used separately, repeats the process for the bottom coil. Used together, the overlays reveal the nature of alternating current.

7. PARALLEL CIRCUITS, OT31-SC808, Base only, $1.50.

Parallel circuits are covered on this transparency through a diagram and printed information.

8. SERIES CIRCUITS, OT32-SC807, Base only, $1.50.

Series circuits are covered on this transparency through a diagram and printed information.

AV-2-21 STATIC ELECTRICITY SERIES, Transparencies For The Overhead Projector, S, PS, NASCO, Fort Atkinson, WI 53538.

1. ELECTRICAL CHARGES, OT454-EE-6, 5 colors, Base and 1 overlay, $5.40.

2. PITH BALL EXPERIMENT, OT455-EE-7, 8 colors, Base and 1 overlay, $7.80.

3. TEMPORARY CHARGE BY INDUCTION, OT456-EE-8, 8 colors, Base and 2 overlays, $7.80.

4. CHARGES INDUCED IN CONTACTING SPHERES, OT457-EE-9, 5 colors, Base and 1 overlay, $5.40.

5. CHARGING BY CONDUCTION, OT458-EE-10, 6 colors, Base and 1 overlay, $7.80.

6. CHARGING BY INDUCTION, OT459-EE-11, 6 colors, Base and 3 overlays, $6.65.

7. STATIC ELECTRICITY, OT460-EE-6-11, complete set of six transparency units listed above, $40.85.

AV-2-22 CURRENT ELECTRICITY SERIES, Transparencies For The Overhead Projector, S, PS, NASCO, Fort Atkinson, WI 53538.

1. ELECTRIC CIRCUIT, OT461-EE-12, 6 colors, Base and 2 overlays, $6.35.

2. SIMPLE VOLTAIC CELL, OT462-EE-13, 5 colors, Base and 2 overlays, $5.65.

3. THE DRY CELL, OT463-EE-14, 5 colors, Base and 2 overlays, $6.35.

4. DRY CELLS IN COMBINATION, OT464-EE-15, 4 colors, Base and 1 overlay, $4.65.

5. CONDITIONS FOR INDUCED EMF, OT465-EE-16, 7 colors, Base and 2 overlays, $7.80.

6. THE EFFECT OF A COIL ON INDUCED CURRENT, OT466-EE-17, 5 colors, Base and 1 overlay, $5.95.

7. AC GENERATOR, OT467-EE-18, 5 colors, Base and 1 overlay, $5.40.

8. DIRECT CURRENT GENERATOR, OT468-EE-19, 4 colors, Base and 2 overlays, $5.65.

9. THE MOTOR EFFECT, OT469-EE-20, 5 colors, Base and 2 overlays, $4.95.

10. THE TRANSFORMER, OT470-EE-21, 5 colors, Base and 1 overlay, $5.40.

11. CURRENT ELECTRICITY, OT471-EE-12-21, complete set of 10 transparency units listed above, $127.50.

AV-2-23 FARM WIRING AND SAFETY, overhead transparencies, S, PS, B/W, $5.75 for set of 38 transparencies, Agricultural Education Teaching Materials Center, Texas A&M University, College Station, TX 77843.

These transparencies are designed to be used with a set of seven lesson plans on Farm Wiring and Safety published by the Texas Education Agency and available from the Agricultural Education Teaching Materials Center at Texas A&M University. They include illustrations of demonstration boards, wiring circuits, grounding electrical equipment, splices and connections, switches, farm wiring layouts, electrical symbols and others.

**EDUCATIONAL LEVEL CODE**

**P–Primary School (Elementary grades)**
**S–Secondary School (Junior & senior high)**
**PS–Post Secondary School**

## Demonstration Boards and Work Kits

AV-3-1 *FARM ELECTRIFICATION TEACHING AIDS, S, PS, 8½ x 11, 50 pp., 1962, The Dayton Power and Light Company, 25 North Main Street, Dayton, OH 45401.

The demonstrations and work problems given are to be used in conjunction with the Vocational Agriculture Electrical Cabinet. The series of demonstrations covers principles of electricity, wiring, and operation of switches, installing and operating electrical outlets, and selecting, operating and caring for electric motors. Plans and specifications for building the cabinet and acquiring the equipment are included.

AV-3-2 *PRACTICAL FARM WIRING DEMONSTRATIONS, Curtis R. Weston and Missouri Farm Electrification Council, Inc., S, PS, 8½ x 11 litho., 1966, Instructional Materials Laboratory, University of Missouri, 8 Industrial Education Building, Columbia, MO 65201.

This text was prepared to assist vocational agriculture teachers and others interested in rural youth to demonstrate adequate and safe electric wiring, as well as to teach proper selection, operation, and care of electric motors. It is designed for use with demonstration panels. Details for the performing of each demonstration are given with explanatory comments.

AV-3-3 *DEMONSTRATION MANUAL, for teaching the fundamentals of electrical distribution and use, Ohio Farm and Home Electrification Council, Inc., S, PS, 8½ x 11 spiral bound, 1964, Ohio Edison Company, 47 Main Street, Akron, OH 44308.

This demonstration manual shows pictures of the demonstration board, lists many materials, and gives ten lessons accompanied by the demonstrations for each.

AV-3-4 *AN ELECTRIC WORK CENTER, for the Vocational Agriculture Shop, Progress Report No. 107, R. N. Jones, E. F. Olver, D. R. McClay, and F. Anthony, S, PS, 8½ x 11 printed, 8 pp., 1953, $0.15, Pennsylvania State University, School of Agriculture, University Park, PA 16802.

This circular gives a detail tools list and lists equipment for an electric work center. The center can be used for demonstration and teaching.

AV-3-5 *DEMONSTRATION MANUAL for Teaching the FUNDAMENTALS OF ELECTRICAL DISTRIBUTION AND USE, William R. Schnug, PS, 8½ x 11, 28 pp., Cooperative Extension Service, Ohio State University, Columbus, OH 43210.

This material was prepared in cooperation with the Ohio Farm and Home Electrification Council. The manual provides teaching demonstrations on farm wiring organized for teachers, electric power supplirs and others instructing farm people, equipment dealers, or wiremen on farm electrical problems. Also includes diagrams and bills of material for demonstration wiring board and its panels.

AV-3-6 *DEMONSTRATION MANUAL for teaching the FUNDAMENTALS OF FARM WIRING, Ralph I. Lipper, Assistant Professor, and Kenneth A. Harkness, Research Engineer, S, PS, 8½ x 11, mimeo., 46 pp., Cooperative Extension Service, Kansas State University, Umberger Hall, Manhattan, KS 66502.

This demonstration guide details a program centered around a demonstration panel and suggests interesting demonstrations that can be performed with it. It is a primary source book for information on planning or how to perform wiring skills.

AV-3-7 *FUNDAMENTALS OF ELECTRICITY DEMONSTRATION, Connecticut Farm Electrification Council, P, S, 8½ x 11, 42 pp., 1962, Connecticut Light and Power Company, Farm Service Department, P. O. Box 2010, Hartford, CT 06101.

This spiral bound booklet consists of fourteen units, simply described demonstrations, to be used with a small demonstration panel.

AV-3-8 *BATTERY CHARGER KIT, S, 8½ x 11, 6 pp., 1966, Agricultural Engineering Department, University of Connecticut, Storrs, CT 06268.

A battery charger made from this kit may be used to rejuvenate flashlight cells and transistor radio batteries. The kit consists of items shown on a bill of materials. A list of tools needed and steps in assembling along with a wiring diagram are included.

AV-3-9 ELECTRIC DEMONSTRATION KIT, S, PS, write for information and prices, Electro-Tech, Inc., 3020 Commerce Way, Hapeville, GA 30354.

A simplified kit designed for teaching basic electricity. It includes 11-inch voltmeter, ammeter and watt-meter with special large numberals readable as far as 20 feet away. All wiring is exposed to class view. It is assembled and recommended by the American Association for Vocational Instructional Materials.

AV-3-10 *PROJECT MATERIALS, for Youth Group Workshop Activities, P, S, 8½ x 11, 30 pp., 1967, $1.50 single copy to non-members, Edison Electric Institute, 750 Third Avenue, New York, NY 10017.

The publication lists "Do It Yourself" electrical kits produced by manufacturers. It is prepared to assist those working with young people to locate kits for assembly. The list includes lighting, fundamentals of electricity, hot beds, motors, generators, radio and electronics, soldering iron, extension cords, and other miscellaneous items.

AV-3-11 *CATALOG, Edmund Scientific Company, P, S, 5 x 8½, 148 pp., Edmund Scientific Company, Barrington, NJ 08007. The same catalog is also available from American Science Center, Inc., 5700 N. Northwest Highway, Chicago, IL 60646.

Items are described as being in the "Science-Optics Mathematics for Hobbyists, Industry, and Schools", and consist of new and surplus items, some listed at what they term "bargain" prices. Current issue contains a few items that might be useful in teaching 4-H or Vocational Agriculture classes in electricity.

AV-3-12 *VENTURA WIRE MOTOR, P, S, 8½ x 11, 6 pp., 1965, limited supply, Agricultural Extension Service, 2200 University Avenue, University of California, Berkeley, CA 94720.

In the leaflet, construction directions are given for making a home-made motor which will run on one or two D batteries. Illustrations and instructions are in detail. The Kit is available from Lyon Rural Electric Company, P. O. Box 30, San Diego, CA 92112.

AV-3-13 *VOLTAGE TESTER 110/220, 4-H Electric project, S, 8½ x 11, 4 pp., 1966, limited supply, Agricultural Extension Service, 2200 University Avenue, University of California, Berkeley, CA 94720.

The leaflet lists materials needed and gives assembly directions; the kit of parts is available from Lyon Rural Electric Company, P. O. Box 30, San Diego, CA 92112. The 4-page leaflet by Robert Davis and D. L. Cousins of California, who designed the tester, is most complete and desirable in connection with the kit.

AV-3-14 *4-H ELECTRIC CIRCUIT KIT, P, S, 8½ x 11, 5 pp., 1965, limited supply, Agricultural Extension Service, 2200 University Avenue, University of California, Berkeley, CA 94720.

The 5-page information and construction leaflet is in detail and well prepared. It lists kit contents and gives directions for assembling. It also outlines how to wire for series and parallel circuits. The kit is available from Lyon Rural Electric Company, P. O. Box 30, San Diego, CA 92112.

AV-3-15 *ELECTRICAL PROJECTS, for Youth, Fairs, or Classes, P, S, 8½ x 11, 4 pp., 1966, Lyon Rural Electric Company, P. O. Box 30, San Diego, CA 92112.

This circular describes 21 items of interest to both 4-H electric project members and vo-ag students. The items may be used as camp projects or member projects. A reference to sources of literature is given.

AV-3-16 *WORKING WITH LIGHT, Construction Projects, S, 8½ x 11, 4 pp. each, 1963, Better Light Better Sight Bureau, 750 Third Avenue, New York, NY 10017.

This set of 12 lighting projects is complete with instructions and diagrams for: table lamp in wood, table lamp in metal, floor lamp, fluorescent bare-lamp channel, driveway light, wall lamp, table lamp with ceramic base, the industrial fixture, the 3-ring fixture, valance, cove and cornice lighting, garden light, and lamp shades.

AV-3-17 *HOME LIGHTING ACTIVITIES BOOK, P, S, 8½ x 11, 22 pp., 1963, Better Light Better Sight Bureau, 750 Third Avenue, New York, NY 10017.

This booklet is a study unit in home lighting and is a good demonstration guide. Pages are perforated so that they can be removed from the book and various activities carried out by small groups. Each page covers one or more useful points to know about light.

AV-3-18 *BASIC ELECTRICITY FROM THE JUNK BOX, P, 8½ x 11, 8 pp., 1966, Member Services Division, National Rural Electric Cooperative Association, 2000 Florida Avenue, NW., Washington, DC 20009.

It is a two-part illustrated leaflet for use by the instructor in demonstrating such things as electrons forced through a circuit, thermo-couple, electric eye, magnetism, circuits, voltage, alternating current, etc., with simple items collected from "the junk box".

AV-3-19 *EXPERIMENTING WITH ELECTRICITY, P, S, 8½ x 11 printed, 40 pp., Rural Sales Section, Alabama Power Company, Birmingham, AL 35202.

This volume shows how to set up and give some 40 electricity demonstrations that also are a part of individual learning and experimenting. It starts with the simple dry cell and concludes with the construction of an electric brazing torch.

AV-3-20 ELECTRIC CONTROLS KIT, S, PS, 18 exercises, 1967, Roy Hill, Electric Council of New England, 1135 Statler Office Building, Boston, MA 02116.

This kit contains equipment and wiring which will allow four teams of students to work simultaneously and learn about electrical controls from the exercises they're required to perform.

AV-3-21 ELECTRIC DEMONSTRATION KITS, P, S, NASCO, Fort Atkinson, WI 53538.

The following kits, on electricity and related subjects, have been developed as classroom and laboratory aids to teach more effectively and rapidly by involving all the senses in the learning processes.

***Indicates items that are in FEC Library**

**1. ELECTRIC MOTOR KIT, S7884, $4.85** per kit of 25.

This is a kit project motor to allow the student to build a simple, basic motor which runs on a flashlight cell, and will actually operate and show him why and how an electric motor runs.

**2. HYDROELECTRIC DAM AND GENERATOR SET, P369, $170.00**

This set is designed to teach the principles of waterpower and electricity. Activities include building an actual dam; running water through a turbine generator to produce electricity; building a transmission line and using electricity to light a lamp, ring a bell, turn a motor, or make an electromagnet. Includes comprehensive teacher's manual.

**3. TURBINE GENERATOR SET, P371, $38.20.**

Demonstrates how a magnet rotating next to a coil produces a flow of electrons in the coil and how alterrating north and south poles produce A.C. current. Shows how the force from a water faucet turns water wheel of a generator to produce 6-12 volts A.C. for lighting a light or ringing a buzzer. Illustrated teacher's manual includes experiments and student science projects and activities.

**4. POWER TRANSMISSION SET, P370, $39.95.**

Illustrates the principles of power transmission. Includes interrupter, lead and resistance wires, two transformers and transmission towers, two lamps and sockets. Includes manual.

**5. HI-DRIVE ELECTRIC MOTOR,** Science and Space Expreimental Kit, **S7830-0001, $2.95.**

Includes everything needed to create direct current motor for powering models, toys, and extremely wide range of small rotating devices.

**6. POWER DRIVES WITH MINATURE MOTOR,** Science and Space Experimental Kit, **S7831-0004, $9.95.**

Includes famous Tiny Atom Motor and everything needed to construct many kinds of electric motor drives—pulley, gear and pinion, friction, gear and worm, crown gear, and many others.

**7. HI-DRIVE ELECTRIC GENERATOR,** Science and Space Experimental Kit, **S7832-0002, $5.95.**

Includes famous Hi-drive motor and all components needed to actually build a real generator, demonstrate generation of electric power, and study principles of electromagnetism.

**8. 4-H ELECTRIC CIRCUIT KIT, S8240-UC-3, $3.60.**

This kit consists of all the basic parts for the 4-H Electric Circuit Kit. Its assembly teaches the importance of good connections and contacts as well as the principle of three-way hookups, single and double throw switches, push switches, series and parallel wiring.

**9. ELECTRIC FURNACE KIT, P363-Y211, $3.10.**

This kit is for high temperature work or experimentation. The oven will melt small quantities of aluminum, lead, tin, etc. Can be used for alloying and tempering experiments. Kit consists of one procelain shell and mounting, one 500-watt element with tie wires and sleeving for leads, one cord with connectors, one roll of asbestos insulation for covering element, and one piece of asbestos board to be cut for doors if desired.

**10. 2-POLE MOTOR, S8264-TPM-2, $0.95** each, **$10.00** per dozen.

Contains all the parts for the simple construction of a 2-pole motor that is easily identified with hobby or other small motors. Includes battery holder. Open construction permits easy observation of parts during function. Encourages students to discover how electricity produces motion by means of its magnetic properties. Includes student instruction sheet.

**11. BASIC ELECTRICITY SET, S1192, $39.95.**

Demonstrates how electricity produces light, heat, sound, magnetism, and motion. Contains magnet wire and coil spool, several wound coils, two miniature lamps with sockets, horseshoe magnet and keeper, compass, buzzer, meter, switch, and other demonstration materials. Instructions and experiments are included in illustrated teacher's manual. Requires 6-volt D.C. power pack or battery (not included).

**12. STATIC ELECTRICITY, S8183-91A-309, $9.50** per kit.

Contains 11 fun-type experiments with balloons, plastic balls and glass rods which demonstrate the fundamentals of static electricity.

**13. FUNDAMENTALS OF ELECTRICITY, S8189-91A-307, $14.95** per kit.

Contains 11 experiments through which pupils learn the causes of electricity, and take part in activities such as making socket and switch terminal connections, removing insulation for wires, etc. Stresses safety throughout.

**14. ELECTROMAGNET, S8261-EMK-2, $0.75** each, **$7.20** per dozen.

Students learn the principles of the compass, the electromagnet, magnetic and electrical direction in this kit. Contains compass needle, compass support, compass card, battery holder, two magnet bars, wire and wire anchors, and a student instruction sheet.

**15. ELECTROMAGNETISM, P627, $4.00** per dozen kits.

This set includes the materials to create a magnet with an electric current. Here are the basic experiments by which Hans Christian Oersted and Joseph Henry unlocked the relationship of magnetism and electricity. Includes all components except a flashlight battery.

16. STATIC ELECTRICITY, P631, $5.00 per dozen kits.

Includes all the materials to conduct Sir William Gilbert's adaptation of Thale's Experiment —plexiglass rod, man-made fur, pieces of aluminum foil, tissue, grains of vermiculite, etc. Full instructions for this interesting series of experiments are also included.

17. "GROUND" OR "SHORT" KIT, P215P-Y202, $2.00.

This appliance testing kit contains one 6-ft. cord with cube top, two spring action attachment caps, and two cartridge neon lights. It will indicate very small flows of current (and even capacity if high) so some allowance for its sensitivity must be made in testing large appliances.

18. OVERLOAD KIT, P219P-Y201, $3.30.

This kit is to be used in demonstrating fire hazard in overloaded, improperly fused, circuits.

19. ELECTRIC SEED STARTER, H541P-SS1, $10.85.

This Easy-Heat Electric Seed Starter includes an expanded polystyrene planting box, clear polyethylene cover sheet, three flexible supports, and one SC-12 Soil Cable with thermostat built in to maintain 70 degree F. growing temperature. Current shuts off automatically when soil is right for accelerating growth of seeds, sprout bulbs, root cuttings, flowers, and vegetables. Unit provides 3 sq. ft. growing area.

20. ELECTRIC HOTBED KITS, P298P-E49E50, $14.40 for 240-watt Kit (for 12 sq. ft. bed), $17.40 for 360-watt Kit (for 18 sq. ft. bed).

Can be used to build your own hotbed for classroom demonstration work, or actual plant starting for later transplanting. The hotbed can be built from local materials, after which the kit required for the bed size can be ordered. Regular Line-O-Heat and Adjustat Controls are used. Includes a Soil Warming Bulletin which gives full information and drawings for the construction and operation of a hotbed.

AV-3-22 ELECTRICAL DEMONSTRATION PANEL BOARD, S, $185.00, Rural Engineering Service, 1525 North 8th Street, Fargo, ND 58102.

This unit is a complete demonstration panel with electrical equipment for demonstrating the principles of electricity, electrical equipment, and electrical safety.

## Charts

AV-4-1 *GENERATION, TRANSMISSION, AND DISTRIBUTION OF ELECTRICITY, P, S, 11 x 14, 9 pp., free to Alabama educators, Alabama Power Company, Box 2641, Birmingham, AL 35202.

This set of nine cards showing distribution of electricity can be used singly or in a group.

AV-4-2 *PARTS AND ASSEMBLY OF A LEAD ACID STORAGE BATTERY, S, PS, 21 x 27, compliments of ESB, Inc., 2 Penn Center, Philadelphia, PA 19102.

This three color wall chart illustrates the components of a lead-acid storage battery.

**EDUCATIONAL LEVEL CODE**

**P—Primary School (Elementary grades)**
**S—Secondary School (Junior & senior high)**
**PS—Post Secondary School**

## TEXTBOOKS, HANDBOOKS, and PUBLICATIONS, ELECTRICITY

### Texts and Booklets

P-1 *ELECTRICAL TERMS, Their Meaning and Use, S, PS, 8½ x 11 printed, 36 pp., 1962, $1.30 each for 10 or more, American Association For Vocational Instructional Materials, Coordinator's Office, Engineering Center, Athens, GA 30671.

Electrical terms are explained, then used in practical illustrations to show value in an everyday understanding of electricity. Also discussed are rates and how electrical energy is purchased. Included is a table listing 122 pieces of farm and home electrical equipment, approximate wattage, and kilowatt-hour usage. A filmstrip and script based on this manual is available; see Item AV-1-3.

P-2 *FUNDAMENTALS OF ELECTRICITY AND MAGNETISM, P, S, PS, 8½ x 11 printed, 36 pp., 1967, $0.40 per copy, Delco-Remy Division of General Motors Corporation, Anderson, IN 46011.

Covers composition of matter, electrons, magnetism and magnets, electromagnetic fields, combined magnetic and opposing magnetic fields, solenoids, magnetic force on a conductor, electromagnetic induction, Ohm's Law, meter movements. Well illustrated with diagrams.

P-3 *LIVING WITH ELECTRICITY, P, S, PS, 8½ x 11 printed, 36 pp., 1967, The Dayton Power and Light Company, 25 North Main Street, Dayton, OH 45401.

This booklet is designed primarily for high school students, with a preface for teachers. It covers how electricity is made; uses in the home, in industry, and on the farm; electrical terms; and average wattage of some appliances.

P-4 *AIDS TO USING ELECTRICITY ON INDIANA FARMS, Harry Leonard, Agricultural Education, and Paul E. Johnson, Agricultural Engineer, S, PS, 8½ x 11 printed, 60 pp., 1962, Agricultural Engineering Department, Purdue University, Lafayette, IN 47907.

Prepared mainly for use in the state's vo-ag classes in developing an understanding of fundamentals of electricity; common terms and measures; common wiring materials, circuit protection; selecting, operating, and care of farm motors; the farm wiring system; lighting the farmstead; using electric heat on the farm; and controls. Application information is divided into ten units and includes charts.

P-5 *BASIC ELECTRICITY AND AN INTRODUCTION TO ELECTRONICS, 2nd edition, S, PS, 8½ x 11 paper back, 192 pp., 1966, $4.25, Howard W. Sams and Company, 4300 West 62nd Street, Indianapolis, IN 46268.

A fundamental text that progresses from the structure of atoms to basic circuits. Covers direct current, cells and batteries, magnetism, alternating current, electromagnetic induction, measurement and control, distribution, heating, lighting, wire communication, radiations, and electronics.

P-6 *THE ABC'S OF ELECTRICITY, P, S, 5½ x 8½ paperback, 96 pp., 1963, $2.50, Howard W. Sams and Company, Inc., 4300 West 62nd Street, Indianapolis, IN 46268.

This text is a guide to learning basic principles of electricity. It explains the "How's and Why's" in terms everyone can understand.

P-7 *PRACTICAL SCIENCE PROJECTS IN ELECTRICITY/ELECTRONICS, Edward M. Noll, P, S, PS, 5 x 7, 480 pp., 1966, $4.95, Theodore Audel and Company, 4300 West 62nd Street, Indianapolis, IN 46268.

This book gives step-by-step construction information for basic electricity and electronics learning demonstrations. Every chapter contains sufficient text material to explain what happens in each demonstration.

P-8 INTERIOR ELECTRIC WIRING, Part I, Residential, Kennard C. Graham, S, PS, 7 x 10 printed, 311 pp., 1961, $5.25, American Technical Society, 838 East 58th Street, Chicago, IL 60637.

This book gives excellent detail, work layout and tools needed, and is good for special classes. A companion study guide is the next item listed.

P-9 STUDY GUIDE FOR INTERIOR ELECTRIC WIRING, Part I, Residential, Robert H. Masterson, S, PS, 7 x 10 printed, 70 pp., 1961, $1.50, American Technical Society, 848 East 58th Street, Chicago, IL 60637.

This guide is based on the textbook "Interior Electric Wiring" and gives in detail thirteen assignments, check tests, and examinations. The book gives excellent details, work layouts, and lists tools needed.

P-10 *ELECTRICIAN'S EXAMINATIONS, Questions and Answers, Edwin P. Anderson, PS, 5½ x 8¼, 288 pp., 1965, $3.95, Theodore Audel and Company, 4300 West 62nd Street, Indianapolis, IN 46268.

A practical handbook for workers and students preparing for all grades of electrician's license examinations. It is a helpful review of fundamental principles underlying each question and answer.

P-11 *ELECTRIC SCIENCE DICTIONARY, Frank D. Graham, S, PS, 5 x 7, 1965, $3.50, Theodore Audel and Company, 4300 West 62nd Street, Indianapolis, IN 46268.

The dictionary is designed as an encyclopedia of electricity, defining over 9,000 words, terms, and phrases, arranged in alphabetical order.

P-12 *ELECTRICAL POWER CALCULATIONS, with Diagrams, Edwin P. Anderson, S, PS, 5 x 7, 298 illustrations, 488 pp., 1965, $4.50, Theodore Audel and Company, 4300 West 62nd Street, Indianapolis, IN 46268.

This text is a student and worker mathematical tool. It explains mathematical formulas and fundamental laws for practical problems in electricity and radio calculations. It contains tables on conversion, wire gauges and capacities, symbols, etc.

P-13 FARM ELECTRIFICATION, R. H. Brown, S, PS, 6 x 9, 210 illustrations, 369 pp., 1956, $9.50, McGraw-Hill Book Company, Inc., 330 West 42nd Street, New York, NY 10036.

Stresses applications, safety features, procedures for selecting equipment and supplies, planning and installing wiring systems, modernization and practical utilization of electricity.

P-14 *ABC'S OF ELECTRIC MOTORS AND GENERATORS, Allan Lytel, S, PS, 5½ x 8½ paperback, 128 pp., 1966, $2.95, Howard W. Sams and Company, Inc., 4300 West 62nd Street, Indianapolis, IN 46268.

The book is a basic introduction to motors and generators, explaining how they operate and the expected performance. Simplified explanations cover both AC and DC motors and generators, types, and applications.

P-15 *LEARNING ELECTRICITY FUNDAMENTALS, Lennard R. Crow, P (limited), S, PS, 5½ x 8½ paperback, 416 pp., 1966, $6.50, Howard W. Sams and Company, Inc., 4300 West 62nd Street, Indianapolis, IN 46268.

Presents fundamentals of electricity in a straight-forward approach. Much of the information can be understood by advanced primary school students. The electric theory is followed by progressive stages of information about DC generation and motors, and AC motors and transformers.

P-16 *ELECTRICAL TEXTBOOK FOR FARMING AND HOMEMAKING, S, PS, 6 x 9, 294 pp., 1965, $2.00, The South Dakota Rural Electric Association, Inc., Box 1138, Pierre, SD 57501.

This book deals with sources of electric power, wiring, the development of modern uses of electricity in the home and on the farm, and emphasizes safety.

P-17 USING ELECTRICITY ON THE FARM, J. Roland Hamilton, S, 6 x 9, 300 illustrations, 421 pp., 1959, list $9.28, net $6.96, Prentice-Hall, Inc., Engelwood Cliffs, NJ 07632.

Six problem units and 14 chapters cover opportunities in electrification, basic electricity, farmstead wiring, electric motors, lighting and water systems, and farm equipment. The text, in simple, clear style, is organized in class-tested problem units.

P-18 PRACTICAL ELECTRIC WIRING, H. P. Richter, 8th edition, S, PS, 5 3/8 x 8, 445 illustrations, 672 pp., 1967, $12.50, McGraw-Hill Book Company, 330 West 42nd St., New York, NY 10036.

This text is intended for either independent study or for class work, and presupposes no previous knowledge of the subject. It is an instruction manual rather than reference: Covers electrical wiring in practical fashion for homes and farms, as well as for industrial and other structures.

P-19 ALL ABOUT HOUSE WIRING, Floyd Mix, S, PS, 6 x 8¾, 176 pp., 196 illustrations, $3.60, Goodheart-Willcox Company, 123 W. Taft Drive, South Holland, IL 60473.

Provides basic wiring fundamentals applicable to wiring new homes, and modernizing wiring in older ones. Covers all details of a house wiring job from installing an extra outlet, to the complete wiring job.

P-20 *THE AC AND DC'S OF ELECTRIC MOTORS, PS, 8½ x 11, 34 pp., $1.95 per copy, Small Motor Division, Westinghouse Electric Corp., Lima, OH 45804.

Explains in simple, non-technical language, the principles and operation of fractional and small integral horsepower electric motors. Intended to give a fundamental knowledge of motor characteristics, but does not provide all the detailed information to make possible the application of motors to specific jobs.

P-21 ALTERNATING CURRENT FUNDAMENTALS, S, PS, 5½ x 8½, 416 pp., $7.50 per copy, Howard W. Sams and Company, 4300 West 62nd Street, Indianapolis, IN 46268.

This book begins with a study of magnetic and electric fields, and goes on to explain inductance, capacitance, and reactance. Series, parallel, and resonant circuits are thoroughly discussed. These principles are then used to explain the construction and operation of transformers, AC generators, and rectifiers. Contains many illustrations and practical examples.

**All materials are 8½ x 11, unless indicated otherwise.**

P-22 *EDISON EXPERIMENTS, Robert F. Schultz, P, S, 5¼ x 8½, 28 pp., 1969, $0.17 per copy, Thomas Alva Edison Foundation, 2000 Second Avenue, Detroit, MI 48226.

Contains 14 experiments, based upon Edison's work, that are designed to give youth some idea of the thorough experimental investigation that Edison performed to achieve a few of his many inventions and developments.

P-23 ELECTRIC MOTORS, Edwin P. Anderson, S, PS, 5½ x 8¼, 432 pp., 1968, $5.95 per copy, Theodore Audel and Company, 4300 West 62nd Street, Indianapolis, IN 46268.

This text covers the installation, maintenance, and repair of all types of electric motors. Includes trouble charts for various types of motors which list symptoms, probably causes, and possible remedies of problems.

P-24 ELECTRICITY MADE EASY, A. M. Pettis, P, S, 6 x 8½, 16 pp., 1966, Cooperative Extension Service, University of Florida, Gainesville, FL 32601.

This booklet is a guide to making simple electrical repairs. It also contains an explanation of electrical terminology.

P-25 FACTS ABOUT STORAGE BATTERIES, S, PS, 5½ x 8½, 31 pp., 1965, ESB Incorporated, 2 Penn Center, Philadelphia, PA 19102.

This well-illustrated text covers a storage battery's chemistry, construction, electrical system, how to buy batteries wisely, how to test batteries, how to recharge batteries, how to install and remove batteries, how to activate dry charged batteries, and how to store batteries.

P-26 HOME APPLIANCE SERVICING, S, PS, 5½ x 8¼, 328 pp., 1965, $6.95 per copy, Theodore Audel and Company, 4300 West 62nd Street, Indianapolis, IN 46268.

This text discusses the basic principles of home appliance servicing, troubleshooting, disassembly, assembly, testing methods, and wiring diagrams. Includes appliance data.

P-27 THE MAGIC OF ELECTRICITY, One Hundred Experiments With Batteries, Sam Rosenfeld, P, 158 pp., 1963, $3.50 per copy, Lothrop, Lee and Shepard, 105 Madison Avenue, New York, NY 10016.

Contains 100 easy, but fascinating, experiments which can be performed with such simple equipment as flashlight batteries and compasses.

P-28 MODERN FARM POWER, 2nd Edition, William J. Promersberger and Frank E. Bishop, S, PS, 7 x 9 1/8, 272 pp., 1970, $10.48 per copy, Prentice-Hall, Inc., Englewood Cliffs, NJ 07632.

Presents a complete, basic coverage of farm engines and electric motors using simple, non-technical language.

P-29 *MODERN LIGHT, New Uses In Protecting and Improving Life, C. E. Colby, P, S, PS, 7½ x 10¾, 48 pp., 1967, $2.86 per copy, Coward-McCann, Inc., 200 Madison Avenue, New York, NY 10016.

This book takes the reader on a words and picture light tour spanning millions of years—starting with the first lighting devices used by man, and continuing on up to the laser beam. Covers lighting for aviation, photography, missile tracking, underwater uses, and plant growth.

P-30 PRACTICAL ELECTRICITY, R. G. Middleton, S, PS, 5½ x 8¼ hardbound, 496 pp., 1969, $5.95 per copy, Theodore Audel and Company, 4300 West 62nd Street, Indianapolis, IN 46268.

Presents in the simplest, most concise form, the fundamental principles, rules, and applications of applied electricity.

P-31 *STORAGE BATTERIES, S, PS, 8½ x 11, 28 pp., 1967, $0.35 per copy, Delco-Remy Division of General Motors Corporation, Anderson, IN 46011.

Covers storage battery components, construction, design details, chemical action, charging circuit, voltage, state of charge, effects of temperature, specific gravity, battery charging, storage, insulation, servicing, and testing. Well-illustrated throughout.

P-32 EDISON INVENTIONS AND RELATED PROJECTS, Robert F. Schultz, P, S, 5½ x 8½, 30 pp., 1968, $0.17 per copy, Thomas Alva Edison Foundation, 2000 Second Avenue, Detroit, MI 48226.

Encourages young people to pursue a technical career by performing Edison's basic experiments.

P-33 *GETTING DOWN-TO-EARTH, PS, 5 x 8, 48 pp., 1967, 2-10 copies $0.50 each, 11-25 copies $0.45 each, 26-50 copies, $0.40 each, 51-100 copies $0.35 each, 101 or more copies $0.30 each, James G. Biddle Company, Township Line & Jolly Roads, Plymouth Meeting, PA 19462.

Outlines how to be well-grounded in earth resistance testing. Provides details on the importance of measuring earth resistance for electrical grounding systems. Contains schematics, charts, graphs, tables, and photos which round out a complete "short course" on the subject of safe grounding of electrical equipment.

P-34 ELECTRICAL EXPERIMENTS YOU CAN DO, Robert F. Schultz, P, S, 5½ x 8½, 28 pp., 1966, $0.17 per copy, Thomas Alva Edison Foundation, 2000 Second Avenue, Detriot, MI 48226.

Helps students to learn to experiment by themselves in the field of electricity.

P-35 *ELECTRICAL SPACE CONDITIONING, Catalog No. TP-126, S, PS, 8½ x 11, 24 pp., 1967, $0.25 per copy, Inquiry Bureau, General Electric Co., Nela Park, Cleveland, OH 44112.

Presents an exposition of the systems concept for taking the greatest advantage of the thermal properties of modern lighting. Includes generalized data for estimating quantitiative improvements in air conditioning and hearing requirements.

P-36 *BLACK LIGHT, Catalog No. TP-125, S, PS, 8½ x 11, 16 pp., 1967, $0.25 per copy, Inquiry Bureau, General Electric Co., Nela Park, Cleveland, OH 44112.

Discusses principal sources and applications of near-ultraviolet energy, and includes a list of suppliers of equipment and materials.

P-37 *FLUORESCENT LAMPS, Catalog No. TP-111, S, PS, 8½ x 11, 24 pp., 1967, $0.25 per copy, Inquiry Bureau, General Electric Co., Nela Park, Cleveland, OH 44112.

Covers the history of fluorescent lamps, operating characteristics, color data, and other performance features.

P-38 *FOOTCANDLES IN MODERN LIGHTING, Catalog No. TP-128, S, PS, 8½ x 11, 18 pp., 1967, $0.25 per copy, Inquiry Bureau, General Electric Co., Nela Park, Cleveland, OH 44112.

Discusses the concepts and research behind modern recommendations for illuminance, and includes tabular listings of recommended minimums for most applications.

P-39 *GERMICIDAL LAMPS, Catalog No. TP-122, S, PS, 8½ x 11, 16 pp., 1967, $0.15 per copy, Inquiry Bureau, General Electric Co., Nela Park, Cleveland, OH 44112.

Covers characteristics and uses of General Electric germicidal tubes.

P-40 *HIGH INTENSITY DISCHARGE LAMPS, Catalog No. TP-109, S, PS, 8½ x 11, 28 pp., 1968, $0.25 per copy, Inquiry Bureau, General Electric Co., Nela Park, Cleveland, OH 44112.

Presents an in-depth look at the principles of operation and specific performance features of mercury, Multi-vapor, and Lucalox lamps.

P-41 *INCADESCENT LAMPS, Catalog No. TP-110, S, PS, 8½ x 11, 32 pp., 1967, $0.25 per copy, Inquiry Bureau, General Electric Co., Nela Park, Cleveland, OH 44112.

Describes parts and construction of incandescent lamps in general, together with a description of special classes of lamps. Includes general performance data on the life, mortality, color temperature, operating voltages, etc. of incandescent lamps.

P-42 *LANDSCAPE LIGHTING, Catalog No. TP-132, S, PS, 8½ x 11, 32 pp., 1966, $0.25 per copy, Inquiry Bureau, General Electric Co., Nela Park, Cleveland, OH 44112.

This four-color booklet covers lighting of residential and commercial landscapes. Discusses effects, equipment, installation details, and light sources.

P-43 *THE LIGHT BOOK, Catalog No. 261-8260, S, PS, 8 3/8 x 5¼, 40 pp., 1969, $0.06 per copy, Inquiry Bureau, General Electric Co., Nela Park, Cleveland, OH 44112.

This illustrated book shows recommended practices for all residential lighting techniques.

P-44 *LIGHT AND COLOR, Catalog No. TP-119, S, PS, 8½ x 11, 32 pp., 1967, $0.50 per copy, Inquiry Bureau, General Electric Co., Nela Park, Cleveland, OH 44112.

This four-color booklet discusses the principles of color, color vision, and colorimetry. It also covers color characteristics of white and colored light sources.

P-45 *LIGHT AND INTERIOR FINISHES, Catalog No. TP-129, 8½ x 11, 8 pp., 1966, $0.25 per copy, Inquiry Bureau, General Electric Co., Nela Park, Cleveland, OH 44112.

This booklet has carefully prepared color chips of known reflectances enclosed in a discussion of the importance of room finishes in lighting design.

P-46 *LIGHT MEASUREMENT AND CONTROL, Catalog No. TP-118, S, PS, 8½ x 11, 28 pp., 1965, $0.25 per copy, Inquiry Bureau, General Electric Co., Nela Park, Cleveland, OH 44112.

Discusses devices and techniques used in general illumination measurements and photometry. Reviews the nature of reflecting, transmitting, refracting, and polarizing materials.

P-47 *OFFICE LIGHTING, Catalog No. TP-114, S, PS, 8½ x 11, 24 pp., 1967, $0.25 per copy, Inquiry Bureau, General Electric Co., Nela Park, Cleveland, OH 44112.

Covers benefits, objectives, enconomics and techniques of lighting design for general and private offices, conference rooms, drafting rooms, and public areas.

P-48 *PEOPLE HEATING WITH INFRARED LAMPS, Catalog No. TP-103, S, PS, 8½ x 11, 16 pp., 1967, $0.15 per copy, Inquiry Bureau, General Electric Co., Nela Park, Cleveland, OH 44112.

Discusses principles and gives descriptive examples of comfort heating design using infrared lamps. Includes design data and sample calculations.

P-49 *PRODUCT HEATING WITH INFRARED LAMPS, Catalog No. TP-116R, S, PS, 8½ x 11, 20 pp., 1967, $0.15 per copy, Inquiry Bureau, General Electric Co., Nela Park, Cleveland, OH 44112.

Covers operating characteristics of infrared lamps for baking, heating, and drying of industrial parts. Includes typical design data and sample calculations for each process.

P-50 *RESIDENTIAL FIXTURE LIGHTING GUIDE, Catalog No. TP-130, S, PS, 8½ x 11, 20 pp., 1968, $0.25 per copy, Inquiry Bureau, General Electric Co., Nela Park, Cleveland, OH 44112.

Discusses principles useful in selecting home lighting fixtures of functional and decorative design.

P-51 *RESIDENTIAL STRUCTURAL LIGHTING, Catalog No. TP-107, S, PS, 8½ x 11, 16 pp., 1968, $0.15 per copy, Inquiry Bureau, General Electric Co., Nela Park, Cleveland, OH 44112.

This booklet includes a presentation of the function and design of lighted valances, cornices, soffits, coves and luminous wall elements. Includes recommended dimensions and fixture hints.

P-52 *PLANT GROWTH LIGHTING, Catalog No. TP-127, S, PS, 8½ x 11, 16 pp., 1966, $0.25 per copy, Inquiry Bureau, General Electric Co., Nela Park, Cleveland, OH 44112.

Discusses electric lighting used for growth and enhancement of plants by hobbyists and researchers. Includes some design data.

P-53 *SCHOOL LIGHTING, Catalog No. TP-102, S, PS, 8½ x 11, 16 pp., 1965, $0.15 per copy, Inquiry Bureau, General Electric Co., Nela Park, Cleveland, OH 44112.

Discusses techniques for achieving lighting of appropriatquantity and quality for general and special purpose classrooms, audio-visual programs, etc.

P-54 ELECTRICITY AND ELECTRONICS–BASIC, William F. Steinberg and Walter B. Ford, S, PS, 336 pp., 1964, $5.75, American Technical Society, 848 E. 58th St., Chicago, IL 60637.

This useful book, now in its third edition, presents a practical, integrated study of modern electricity and electronics. Provides an effective means of presenting fundamental principles through the use of related work projects–interesting things to do. Step-by-step instructions show how to build more than 60 fascinating and inexpensive projects–each one a dramatic demonstration of an important principle of electrical and electronic behavior.

P-55 HOW TO READ ELECTRICAL BLUEPRINTS, Gilbert M. Heine, Carl H. Dunlap, and C. S. Jones, S, PS, 320 pp., $5.25, American Technical Society, 848 E. 58th St., Chicago, IL 60637.

This popular reference covers the eight branches of the electrical field. Requires only a basic knowledge of electricity.

P-56 INDUSTRIAL AND COMMERCIAL WIRING, Kennard C. Graham, S, PS, 290 pp., $6.50, American Technical Society, 848 E. 58th St., Chicago, IL 60637.

Offering a complete resume of all facets of industrial and commercial wiring, this publication takes into account the changes and progress made in fixture design, equipment, and new materials. Includes plenty of new material on lighting and wiring problems for special purposes such as swimming pools, area lighting, display case lighting, etc.

P-57 TRANSFORMERS, Carl H. Dunlap, W. A. Siefert, and Frank E. Austin, S, PS, 277 pp., $4.50, American Technical Society, 848 E. 58th St., Chicago, IL 60637.

This book provides the necessary background for understanding the principles of design, construction, and installation of transformers.

P-58 UNDERSTANDING AND SERVICING FRACTIONAL HORSEPOWER MOTORS, Kennard C. Graham, S, PS, 256 pp., $5.50, American Technical Society, 848 E. 58th St., Chicago, IL 60637.

This publication has incorporated the best features of two long-popular texts, "Small Commutator Motors" and "Small Non-Commutator Motors" into a modern text covering the principles of operation and repair of both AC and DC electric motors–one horsepower and less.

P-59 RAPID ELECTRICAL ESTIMATING AND PRICING, C. Kenneth Kolstad, S, PS, 8½ x 11, 320 pp., 1969, $12.50, McGraw-Hill Book Company, 330 West 42nd Street, New York, NY 10036.

This publication is intended as a guide for accurate and rapid electrical estimating. Includes all-inclusive cost charts which show labor, material, overhead, direct job expenses, and a reasonable profit. Each takes into account average installation conditions, labor, etc. so that these "averages" can easily be adapted to prevailing costs in any area under construction. Covers lighting, circuit protection, services, feeders, branch circuits, power equipment, and auxiliary systems.

P-60 FRACTIONAL & SUBFRACTIONAL HORSEPOWER ELECTRIC MOTORS, C. G. Veinott, S, PS, 500 pp., 1970, $16.50, McGraw-Hill Book Company, 330 West 42nd Street, New York, NY 10036.

This up-to-the-minute fully illustrated instruction manual gives authoritative, completely detailed answers to just about any question on today's small electric motors. Concentrating on important recent developments in the industry, changes in standards, and the vastly increased applications of motors, it covers an amazing number and variety of motors in how-to-do-it terms that make it easy to use on the job.

P-61 MOTOR APPLICATION AND MAINTENANCE HANDBOOK, S, PS, 656 pp., 1969, $25.00, McGraw-Hill Book Company, 330 West 42nd Street, New York, NY 10036.

This comprehensive guide to the selection, use, and care of electric motors includes: AC and DC; induction and synchronous; shunt, series, and compound; large, NEMA, fractional horsepower, miniature sizes, and specialty designs. Covers bearings, couplings, etc., and gives extensive information on lubrication, maintenance, repair, salvage, and modification.

**All materials are 8½ x 11, unless indicated otherwise.**

P-62 DESIGN CRITERIA FOR LIGHTING INTERIOR LIVING SPACES, PS, 48 pp., $3.00, Publication Office, Illuminating Engineering Society, 345 East 47th Street, New York, NY 10017.

This book has been prepared for anyone concerned with using light as a decorative and utilitarian element in residential-type interiors. Principles and subjects treated throughout are applicable for all interior living space, not only residences. Many areas in commercial and industrial buildings, such as waiting rooms, reception area, eating places and private offices, where a residential environment is desirable, have been included.

P-63 ABC'S OF ELECTRICITY/ELECTRONICS, S, PS, 5½ x 8½ paperbacks, 128 pp., each, 1967, available individually by the titles/codes/prices shown below, Howard W. Sams & Co., Inc., 4300 West 62nd Street, Indianapolis, IN 46268.

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| ABC'S OF ELECTRIC MOTORS & GENERATORS | 20186–$2.95 |
| ABC'S OF ELECTRONIC TEST EQUIPMENT | 20660–$2.95 |
| ABC'S OF ELECTRONICS | 20185–$2.50 |
| ABC'S OF ELECTRICITY | 20263–$2.50 |
| ABC'S OF ANTENNAS | 20010–$2.50 |

Each book provides a clear introduction to the respective subject of technical interest. Written by outstanding authorities, these books are illustrated with many simplified drawings and photos.

P-64 ELECTRIC GARDENING, EEI No. 69-57, S, PS, 8½ x 11, 52 pp., 1969, 1-9 copies $1.50 each, 10-99 copies $1.35 each, 100-999 copies $1.20 each, 1000 or more copies $1.00 each, member prices available upon request, Marketing Division, Edison Electric Institute, 750 Third Avenue, New York, NY 10017.

This booklet was prepared to help the hobbyist and the commercial grower to use electricity for fun and profit, to produce better plants, and to make gardening easier. It's divided into 13 sections covering: Electric light and plant growth; electric heating of greenhouses; electrically heated hotbeds; automatic greenhouse ventilation; summer cooling; watering; bulb forcing; light garden ideas; ideas for a greenhouse; materials handling for plant growing; wiring and grounding; outdoor lighting: The way it works; and suggested publications on electric gardening.

P-65 *CAREERS IN LIGHTING, S, 7 x 8, 8 pp., free upon request, Illuminating Engineering Society, 345 East 47th Street, New York, NY 10017.

Discusses careers in illuminating engineering, and reviews some of the specialties of engineers working in this field. Tells whom to contact for information about schools offering lighting courses, and up-to-date salary ranges of engineers.

P-66 BASIC ELECTRICITY/ELECTRONICS, S, 5½ x 8½, set of five with workbook, 250 pp. each, 1968, $19.95 per set, $4.95 for workbook, Howard W. Sams & Co., Inc., 4300 West 62nd Street, Indianapolis, IN 46268.

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| BASIC PRINCIPLES AND APPLICATION | 20167 |
| HOW A-C AND D-C CIRCUITS WORK | 20168 |
| UNDERSTANDING TUBE & TRANSISTOR CIRCUIT | 20169 |
| UNDERSTANDING & USING TEST INSTRUMENTS | 20170 |
| MOTORS & GENERATORS–HOW THEY WORK | 20171 |
| WORKBOOK WITH LAB EXPERIMENTS | 20544 |

This is a fundamental set of instruction that progresses from the basic principles of electricity and electronics to the operation of motors and generators.

P-67 ELECTRICAL CONTRACTING, Ray Ashley, PS, 7¼ x 9 7/8, 287 pp., $11.50, McGraw-Hill Book Company, 330 West 42nd Street, New York, NY 10036.

Includes practical guidance on: Handling contracts, writing proposals for electrical construction, estimating and explaining tool costs, and how to bill and collect from customers. It's a convenient reference containing facts which are designed to help conduct an electrical contracting business at maximum profit level.

P-68 *49 EASY TRANSISTOR PROJECTS, Robert M. Brown and Tom Kneitel, S, PS, 5½ x 8½ paperback, 64 pp., 1968, $1.75, Catalog No. 20617, Howard W. Sams & Co., Inc., 4300 West 62nd Street, Indianapolis, IN 46206.

This book provides complete, easy-to-understand instructions for building an AM radio, FM Radio, light relay controls, audio amplifiers, code-practice oscillators, and test equipment using inexpensive parts which can often be salvaged from old radio and TV sets. All projects are designed to be constructed with a minimum number of components, and most projects can be completed in one evening. Each project is complete with descriptive text, parts list, and schematic diagram.

P-69 ELECTRICAL ENGINEERS HANDBOOK, Arthur Liebers, PS, 284 pp., $7.95, Key Publishing Co., 830 Broadway, New York, NY 10003.

This comprehensive one-volume guide and reference book contains designs, drawings, charts, and tables covering modern engineering principles utilized in industry and construction. Arranged for quick reference.

P-70 *ATOMS TO KILOWATTS, S, PS, 8½ x 5½, 18 pp., Commonwealth Edison Company, 72 W. Adams St., Chicago, IL 60690.

This graphically illustrated booklet tells a short fascinating story of the atom and how it is harnessed to produce electric energy at Dresden Station in Illinois.

## Handbooks, Manuals, and Guides

P-1-1 *FARMSTEAD WIRING HANDBOOK, Industry Committee on Interior Wiring Design, S, PS, 8½ x 11 printed, 73 pp., 1970, 1-5 copies $1.50 each, 6-25 copies $1.00, 26-99 copies $0.60, Edison Electric Institute, 750 Third Avenue, New York, NY 10017, or Farm Electrification Council, Box 1008, Oak Brook, IL 60523.

A comprehensive handbook representing the electrical industry's opinion as to the minimum for farmstead wiring systems to provide reasonable adequacy for present and future needs.

P-1-2 *SIMPLIFIED ELECTRIC WIRING HANDBOOK, S, PS, 8½ x 11, printed, 55 pp., 1964, $0.50, Sears, Roebuck and Company, 7401 Skokie Blvd., Skokie, IL 60076.

Handbook covers wiring principles, planning, grounding, adding new circuits, indoor wiring, connecting switches, tools needed, circuit failures, wiring farms and ranches, outdoor wiring and lighting, basic wiring materials, and new products.

P-1-3 *WIRING DIAGRAMS, For Light and Power, Edwin P. Anderson, PS, 5½ x 8¼, 320 pp., 1965, $4.50, Theodore Audel and Company, 4300 West 62nd Street, Indianapolis, IN 46268.

A practical handbook of electrical hook-ups. Electric wiremen, construction engineers, contractors, and students will find the diagrams complete and self-explaining.

P-1-4 *MAINTAINING THE HOME LIGHTING AND WIRING SYSTEM, S, PS, 8½ x 11 printed, 141 illustrations, 62 pp., 1965, $2.00, American Association For Vocational Instructional Materials, Engineering Center, Athens, GA 30601.

This do-it-yourself type manual gives a comprehensive treatment of correct and safe procedures for replacing electrical items that are most likely to wear out or give trouble. Quality of materials and operating principles are explained for some items.

P-1-5 *FARM ELECTRIC MOTORS, SELECTION, PROTECTION, DRIVES, S, PS, 8½ x 11 printed, 41 illustrations, 36 pp., 1964, $1.00, American Association For Vocational Instructional Materials, Engineering Center, Athens, GA 30601.

Includes non-technical information any student or farmer should know about single-phase motors commonly used on farms, their capacities, and limitations, what electrical and mechanical protection to provide, and how to properly connect them to driven machines. Tables are included. A filmstrip and script based on this pamphlet is available, see items AV-1-1 and AV-1-2.

P-1-6 *INTRODUCTION TO ELECTRIC MOTORS, SELECTION, OPERATION, AND CARE, S, PS, 8½ x 11 ring binder, 43 pp., 1964, inquire about availability, Potomac Edison Company, Downsville Pike, Hagerstown, MD 21740.

The assembled teaching materials are provided to help the student to understand electric motors—their selection, operation, and care. Included are booklets: "Farm Electric Motors" by American Association For Vocational Instructional Materials, Item P-1-5; "Protection Handbook based on 1962 Code" by Bussmann Manufacturing Division of McGraw-Edison Co., Item P-1-7.

P-1-7 *PROTECTION HANDBOOK, Based on 1968 Code, S, PS, 8½ x 11, 26 pp., 1969, Bussmann Manufacturing Division of McGraw-Edison Company, University at Jefferson, St. Louis, MO 63107.

It contains suggestions to help in selecting protective devices for electric circuits, motors, appliances, and apparatus, and includes a list showing size to use.

P-1-8 *ELECTRICAL AND BASIC CONTROLS USED IN AGRICULTURAL PRODUCTION, Suggestions for Teaching, S, PS, 8½ x 11, 60 pp., $4.75 (Members of EEI $4.00), 2-9 copies $3.75, 10 and over $3.00, Edison Electric Institute, 750 Third Avenue, New York, NY 10017.

This guide is a compilation of materials from various states. Covers controls and basic control circuits for agricultural production machinery. It is in the form of lesson plans, and is accompanied by a set of transparencies ready for overhead projection.

P-1-9 *MODERN ELECTRIC CONTROLS, An application Manual, J.F. McPartland, PS, 8½ x 11 printed, 54 pp., 1961, Furnas Electric Company, 1000 McKee Street, Batavia, IL 60510.

This manual gives ready-reference data on equipment and techniques for control of power, heating, and lighting loads; and covers operation of control equipment, selection of proper sizes and ratings, layout and installation of circuits.

P-1-10 *ELECTRICAL MOTOR CONTROLS AND CIRCUITS, J. David Fuchs and Stephen W. Garstang, PS, 5½ x 8½ paperback, 288 pp., 1963, $5.75, Howard W. Sams and Company, Inc., 4300 West 62nd Street, Indianapolis, IN 46268.

A comprehensive handbook for designers, installers, and maintenance personnel, covering motor starting, speed reduction, motor reversal, pilot devices, control circuit design, and motor protection. Book is not designed to specifically cover farm applications, but would be valuable to installers and service men working on farm motor applications.

P-1-11 *CAMP COUNSELORS' MANUAL FOR TEACHING, Fundamentals of Good Lighting, P, S, 8½ x 11, 20 pp., 1964, The Connecticut Light and Power Company, Farm Service Department, P.O. Box 2010, Hartford, CT 06101.

P-1-12 ARC WELDING MANUAL, W. A. Sellon and John W. Matthews, S, PS, 8½ x 11, 44 pp., 1966, $0.50 postpaid, James F. Lincoln Arc Welding Foundation, P.O. Box 3035, Cleveland, OH 44117.

This non-technical manual gives simple and direct instruction, includes all necessary data, and is well-illustrated. It is a practical manual for vo-tech and vo-ag teachers, as well as for self instruction.

P-1-13 *A STITCH IN TIME, Electrical Insulation Testing Manual, S, PS, 5 x 8, heavy paper, 56 pp., 1966, 2-10 copies $0.50, one copy free, James G. Biddle Company, Township Line & Jolly Roads, Plymouth Meeting, PA 19462.

One objective of this handbook is to help the reader understand electrical insulation testing and become familiar with methods and equipment to do the job. Instruction is aided by slides or filmstrip and record.

P-1-14 AMERICAN ELECTRICIANS HANDBOOK, Terrell Croft, 9th Edition, S, PS, 1640 illustrations, 1648 pp., write for price, McGraw Hill Book Company, Inc., 330 West 42nd Street, New York, NY 10036.

This wiring and engineering handbook includes complete data on wires and cables, conductor materials, wiring tables, distribution systems, transformers, motors, calculating load on circuits, voltage drop, carrying capacities and care, installation, and selection.

P-1-15 FUNDAMENTALS OF ELECTRICITY, 5th Edition, Kennard C. Graham, S, 325 illustrations, 342 pp., $6.00, American Technical Society, 848 East 58th Street, Chicago, IL 60637.

This book relates electrical fundamentals to modern application. A study guide is available for use with the book, costing $2.10.

P-1-16 NATIONAL ELECTRICAL CODE AND BLUEPRINT READING, 4th Edition, Kennard C. Graham, S, PS, 8½ x 11, spiral bound, 156 pp., 330 illustrations, $5.40, American Technical Society, 848 East 58th Street, Chicago, IL 60637.

Based on 1968 Code, it covers single family and multi-family dwellings, commercial and industrial locations, and special and hazardous locations. Each section has trade competency tests for students, plus three final examination tests. Includes a list of symbols commonly used in blueprints.

P-1-17 *THE HOW AND WHY WONDER BOOK OF ELECTRICITY, P, 8¼ x 11, 48 pp., 1960, $0.59, Grosset & Dunlap, Inc., 51 Madison Ave., New York, NY 10010.

Gives answers to questions about electrcity that are easy for young people to understand. Story of Mike and his sister who explore the wonders of electricity with their father.

P-1-18 *ELECTRICITY IN YOUR LIFE, Eugene David, P, 6¾ x 8½, 72 pp., 1963, $3.95, Prentice-Hall, Inc., Englewood Cliffs, NJ 07632.

In simple words and instructive pictures, describes currents, circuits, generators, and motors, and the many ways electricity and electronics are so important today. Also, includes some safety hints, and three easy projects on making a conductor tester, a switch, and an electromagnet.

P-1-19 *THE BOY ELECTRICIAN, Alfred P. Morgan, P, S, 5½ x 7, 407 pp., 1962, $5.95, Lothrop, Lee, and Shepard, 105 Madison Avenue, New York, NY 10010.

A guide to practical electricity and radio, including plans and drawings for home construction.

P-1-20 PRIMER OF LAMPS AND LIGHTING, 2nd Edition, S, PS, 6⅛ x 9¼, 241 pp., 1965, $3.50, Sylvania Electric Products, Inc., Central Advertising, 1100 Main Street, Buffalo, NY

The book is used in training lamp and fixture salesmen, but is useful as a reference at the high school level. Topics are basic points of electrical theory, light and lighting terms, construction and characteristics of incandescent lamps, operation of fluorescent lamps, mercury lamps, other light sources, light meters, lighting principles and calculations, using the lighting slide rule, examples of lighting layouts, and lighting in your home.

P-1-21 *WIRING SIMPLIFIED, H. P. Richter, S, PS, 5⅜ x 8 paperback, 144 pp., 1968, 1-5 copies $1.00 postpaid and remittance sent with order, Park Publishing, Inc., P.O. Box 8517, Minneapolis, MN 55408.

Basically a how-to book with emphasis on the reasons why things are done in specific ways. It will serve instructors teaching electricity to vo-ag classes as well as electricians.

P-1-22 ELECTRICAL ESTIMATING, Ray Ashley, revised 3rd edition, PS, 7⅝ x 9 7/8, 435 pp., 1966, $16.50, McGraw-Hill Book Company, 330 West 42nd Street, New York, NY 10036.

Includes illustrations, charts, and tables to show how to prepare accounts and accurate estimates, figure duration costs, check pricing, make estimating drawings, prepare title sheet, plan and divide work, develop labor units, and explain questions and answers.

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*Indicates items that are in FEC Library

P-1-23 ELECTRICAL EQUIPMENT MANUAL, McPartland and Novak, PS, 6 x 9, 179 illustrations, 281 pp., $7.00, McGraw-Hill Book Company, 330 West 42nd Street, New York, NY 10036.

Comprehensive coverage of facts on a multitude of electrical equipment in electrical construction and maintenance. Sketches are captioned for easier understanding of how devices operate.

P-1-24 *LIGHTING HANDBOOK FOR INDUSTRIAL ARTS CLASSES, S, PS, 6 x 9, 112 pp., 1963, $2.00, Better Light Better Sight Bureau, 750 Third Avenue, New York, NY 10017.

Prepared especially for industrial arts teachers, this manual covers light, lighting, the seeing processes, and methods for teaching about light and sight.

P-1-25 *RESIDENTIAL WIRING DESIGN GUIDE, EEI Publication No. 69-53, PS, 5½ x 8½, 32 pp., 2-9 copies $0.35, 10-99 copies $0.20, 100-999 copies $0.18, 1000 or more copies $0.15, Edison Electric Institute, 750 Third Avenue, New York, NY 10017.

This is a booklet on how to plan an adequate wiring system. (The purpose of the National Electrical Code is to establish minimum safety standards for a hazard-free system.) Adequacy and efficiency must be planned.

P-1-26 LIGHTING HANDBOOK, 4th edition, S, PS, 8½ x 11½, approx. 575 pp., 1966, $15.00, Illuminating Engineering Society, 345 East 47th Street, New York, NY 10017.

The 25 sections giving the latest information on lighting practices include the physics of light; light sources and control; interior lighting design; roadway, aviation, transportation lighting; residential lighting; and others.

P-1-27 *NATIONAL ELECTRICAL CODE 1968, PS, 5 x 7½, 480 pp., $2.00, National Fire Protection Association, 60 Batterymarch Street, Boston, MA 02110.

This most widely adopted and used safety code in the U.S. contains authoritative requirements for the practical safeguarding of persons, buildings, and contents from hazards arizing from the use of electricity for light, heat, power, radio, signaling, and other purposes.

P-1-28 NFPA HANDBOOK OF THE NATIONAL ELECTRICAL CODE, PS, 5 3/8 x 8, 694 pp., 1969, $12.75, National Fire Protection Association, 60 Batterymarch Street, Boston, MA 02110.

Discusses the entire 1968 National Electrical Code with explanations of intent. Includes skillfully planned diagrams, photographs, and tables.

P-1-29 ELECTRICAL CODE FOR ONE AND TWO-FAMILY DWELLINGS, PS, 5 x 7½, 140 pp., 1969, $1.75, National Fire Protection Association, 60 Batterymarch Street, Boston, MA 02110.

Excerpted from the 1968 National Electrical Code, this handbook provides all the information needed to meet NEC requirements when installing electrical services in dwellings.

P-1-30 LOW-VOLTAGE REMOTE-CONTROL SWITCHING, MANUAL OF LIGHTING CONTROL CONCEPTS-DESIGNS-INSTALLATIONS, FOR ARCHITECTS, ENGINEERS, AND CONTRACTORS, PS, 8½ x 11, 43 pp., 1968, $1.00, Wiring Device Department, General Electric Company, 95 Hathaway Street, Providence, RI 02904.

This manual is published for architects, consulting engineers, electrical contractors, and others involved in the application, design, and installation of electrical wiring for construction or modernization of office buildings, commercial buildings, industrial plants, schools, and hospitals.

P-1-31 THE ELECTRONICS VEST POCKET REFERENCE BOOK, PS, 192 pp., 1970, $3.50, Prentice-Hall, Inc., Englewood Cliffs, New Jersey 07632.

This handy, pocket-sized reference guide contains tables, lists, formulas, and laws necessary for anyone working in electronics. Includes electronic principles which are applicable in all branches of the technology and are particularly valuable to anyone, novice or expert, who is working with electronic or electrical equipment.

P-1-32 REMOTE-CONTROL LOW-VOLTAGE RELAY SWITCHING-INSTALLATION MANUAL FOR ELECTRICAL CONTRACTORS, PS, 8½ x 11, 23 pp., 1969, Wiring Device Department, General Electric Company, 95 Hathaway Street, Providence, RI 02904.

Written for electrical contractors, this manual provides data on commercial, industrial, and residential applications, as well as technical information. Each topic is covered in a separate section which includes color-coded schematic information.

P-1-33 *WIRING SPECIFICATION, PS, 5½ x 8½, 86 pp., 1969, $0.75 plus tax and postage, Iowa Association of Electric Cooperatives, 323 University Avenue, Des Moines, IA 50314.

Establishes a standard set of wiring specifications for the rural electric cooperatives in Iowa. These specifications were prepared in order to promote safe and efficient use of electricity on the farms and in the rural homes of Iowa.

P-1-34 GUIDE TO THE 1968 NATIONAL ELECTRICAL CODE, Roland E. Palmquist, PS, 5½ x 8¼ hardbound, 448 pp., 1968, $6.95, Theodore Audel and Company, 4300 West 62nd Street, Indianapolis, IN 46268.

Written by a full-time electrical inspector, this guide offers an interpretation and simplification of the most used and more complex sections contained in the National Electrical Code. It is not meant to replace the NEC, but rather to supplement it.

P-1-35 MODERN DICTIONARY OF ELECTRONICS, Rudolf E. Graf, S, PS, 6 x 9 hardbound, 608 pp., 1968, $9.95, Howard W. Sams and Company, 4300 West 62nd Street, Indianapolis, IN 46268.

Contains approximately 16,500 terms—all directly associated with the science of electricity/electronics. Includes many terms in such new and specialized fields as microelectronics, space electronics, semiconductors, computers, data processing, etc

P-1-36 *AC & DC MOTOR MAINTENANCE, PS, 4¾ x 7, 34 pp., $0.30, Apparatus Service Divisions, Westinghouse Electric Corp., Pittsburgh, PA 15230.

This handbook is designed to aid in preventive maintenance work with AC and DC motors. Tells how to head off costly major breakdowns by instituting a system of inspection, minor repairs, and adjustments.

P-1-37 *ELECTRIC MOTORS, Arkansas Rural Electrification Council in cooperation with the Arkansas Department of Education, S, 8½ x 11, 89 pp., 1967, $1.00 per copy, George Newberry, Arkansas Rural Electrification Council, P.O. Box 9469, Little Rock, AR 72209.

This handbook covers the theory, application and care of fractional horsepower electric motors.

P-1-38 FUSEOLOGY, S, PS, 8½ x 11 printed, 13 pp., Bussmann Manufacturing Division of McGraw-Edison Company, University at Jefferson, St. Louis, MO 63107.

This handbook describes the various types of fuses available today, provides methods for trouble shooting and avoiding poor contact, and discusses the general construction and history of fuses.

P-1-39 *ELECTOGRAPHY PRODUCERS MANUAL, Television techniques for television tape production, PS, 8½ x 11, 43 pp., 1968, $5.00 per copy, Marketing Services Department, Magnetic Products Division, 3M Company, 3M Center, St. Paul, MN 55101.

This excellent manual is designed to give formal educators, and instructors in business and industry, general "how to" guides that will help them work with television as a teaching and communications tool to achieve proficient and satisfactory results. Covers: The television facility; strategy of the television team; getting the most from the system; visuals; lighting; handling the finished tape; color; and the video tape-video recorder relationship.

P-1-40 LABORATORY ACTIVITIES WITH LIGHT, S, PS, 1959, 42 pp., $2.25, Illuminating Engineering Society, Publications Sales Office, 345 East 47th Street, New York, NY 10017.

For secondary school students, but equally good for adults interested in basic knowledge of light and light control. The information supplements physics or science texts with twelve laboratory experiments specifically on light and lighting, easily performed with minimum equipment.

P-1-41 1970 CENTURY MOTOR APPLICATION GUIDE, S, PS, 16 pp., 1970, Century Electric Company, 1806 Pine Street, St. Louis, MO 63166.

This guide covers three-phase, single phase, and direct current 1/20 to 600 HP motors.

P-1-42 SMALL INDUSTRIAL DUTY MASTER AC MOTORS, PS, 16 pp., Reliance Electric Company, Industrial Drives Group, Cleveland, OH 44117.

Contains application and performance data, construction features, ratings and dimensions of small industrial duty master AC motors.

P-1-43 *ELECTRICITY, Boy Scouts of America Merit Badge Series, P, S, PS, 5 3/8 x 8, 58 pp., 1969, $0.45 per copy, Boy Scouts of America, Highway 1, New Brunswick, NJ 08902.

In addition to listing the requirements for obtaining a merit badge for electricity, this very thorough handbook covers in nine separate sections: the electrical age, what is electricity, three forms of electricity, common electrical terms, current in motion, electrical repairs, things to make, electrical accidents, and careers in the electrical field.

**EDUCATIONAL LEVEL CODE**

P—Primary School (Elementary grades)
S—Secondary School (Junior & senior high)
PS—Post Secondary School

## Bulletins and Circulars

P-2-1 *FUNDAMENTALS OF GOOD LAMP BUILDING, P, S, 8½ x 11 litho., 8 pp., Rural Sales Section, Alabama Power Company, 600 North 18th Street, Birmingham, AL 35202.

Gives good and bad examples of lamps and lighting, and discusses what factors make for a good reading lamp. It gives detailed instructions for making one, and for the selection of the proper bulb. Makes suggestions for shade selection.

P-2-2 *IMPROVING STUDY LIGHTING, Circular E-785, Lucille A. Clark, P, S, 6 x 9 printed, 16 pp., 1966, Cooperative Extension Service, Oklahoma State University, Stillwater, OK 74074.

This is a well illustrated and easy to understand circular on study lighting. It shows many correct and incorrect situations.

P-2-3 *CHOOSING AND USING PORTABLE LAMPS, Leaflet 772, Lucille A. Clark, S, 6 x 9 printed, 16 pp., 1966, Cooperative Extension Service, Oklahoma State University, Stillwater, OK 74074.

A good circular to use when preparing portable lamp demonstrations; gives a complete treatment of understanding, selecting, and applying portable lamps. Includes some 30 illustrations with appropriate dimensions.

P-2-4 *LIGHTING FOR BETTER LIVING, P, S, 4 x 9 folded leaflet, free, Better Light Better Sight Bureau, 750 Third Avenue, New York, NY 10017.

This is a list of Better Light Better Sight Bureau supplementary lighting program study materials.

P-2-5 *WORKING WITH LIGHT, P, S, 4 x 9 folded leaflet, free, Better Light Better Sight Bureau, 750 Third Ave., New York, NY 10017.

A listing of programs of supplementary study materials suitable for use in industrial arts and vocational education classes, and in 4-H groups.

P-2-6 *SINGLE-PHASE ELECTRIC MOTORS FOR FARM USE, Farmers' Bulletin No. 2177, S, PS, 6 x 9, 24 pp., 1964, U.S. Department of Agriculture, Washington, DC 20250, or local County Extension Service Office.

Subject matter includes types, selection, installation, motor protection, control, and servicing.

P-2-7 *ELECTRODES FOR FARM ARC WELDING, Circular Ae60, S, PS, 8½ x 11, 8 pp., 1962, Extension Service, North Dakota State University, Fargo, ND 58102.

This bulletin explains the AWS-ASTM Classification of Arc Welding Electrodes, discusses the types of electrodes to be used for various welding jobs, and lists some of the manufacturers and their brand names.

P-2-8 *TEACHERS GUIDEBOOK FOR LIVING WITH LIGHT, P, 8½ x 11, 8 pp., 1963, Better Light Better Sight Bureau, 750 Third Avenue, New York, NY 10017.

Contains suggestions for the use of the Bureau's filmstrips, study leaflets, and other component parts of a study project on light and sight.

P-2-9 *EDUCATIONAL MEDIA INDEX, Industrial and Agricultural Education, 7 x 11, 268 pp., 1964, McGraw-Hill Book Company, 330 West 42nd Street, New York, NY 10036.

Listed and carefully classified are educational visuals, such as films, kinescopes, filmstrips, flat pictures, slides, transparencies, and video tapes. Information on charts, graphs, maps, etc., is available from the same source

P-2-10 *ELECTRICAL SAFETY LEAFLETS, Electrical Farm Safety Committee, P, S, 8½ x 11 folded, limited supply, one copy free, Farm Sales Department, Connecticut Light and Power Company, P.O. Box 2010, Hartford, CT 06101.

Leaflets point out safe practices.

P-2-11 *ELECTRIC FARM POWER QUARTERLY, S, PS, 8½ x 11, 4 pp., published quarterly, write for availability information, North Dakota Power Use Council, c/o Agricultural Engineering Department, North Dakota State University, Fargo, ND 58102

These leaflets present application and understanding information about the use of electricity in the home and on the farm. Give good references suitable for 4-H, vocational agriculture, and vocational technology use

P-2-12 *SAFETY GROUNDING, S, PS, 8½ x 11, 4pp. fold, one copy free, Rural Sales Section, Alabama Power Company, 600 North 18th Street, Birmingham, AL 35202.

Based on the 1962 National Electrical Code, with references to it by paragraph number. Revisions, including Code changes, will be made when the present supply is exhausted.

P-2-13 *LEARNING WITH LIGHT, TCP-10, P, SPS, 8½ x 10½, 8 pp., 1970, $0.10 per copy, Large Lamp Department, General Electric Company, Nela Park, Cleveland, OH 44112.

Designed to aid students in improving their study habits through the use of good lighting. Includes information on how to design a study center, factors contributing to the quantity and quality of study lighting, and importance of the design and placement of study lamps.

P-2-14 *ELECTRICAL POWER SYSTEMS FOR THE FARM, Farm Electrification Leaflet No. 70, D. W. Works, PS, 8½ x 11, 4 pp., 1969, Agricultural Extension Service, University of Idaho, Moscow, ID 83843.

Covers the advantages of electric motors over other sources of power for the farmstead. The major part of this circular is devoted to types of drive mechanisms including: direct drive, V-belt drives, SCR variable-speed units, and automatic clutch units.

P-2-15 *GROWING PLANTS ELECTRICALLY, Darnell R. Lundstrom and Earl R. Miller, S, PS, 8½ x 11, 4 pp., 1970, North Dakota Power Use Council, c/o Agricultural Engineering Department, North Dakota State University, Fargo, ND 58102.

Discusses lighting requirements for growing plants indoors. Covers types of lights, fixtures for fluorescent lamps, light intensities, location of light source, photoperiod, temperature, humidity, electric hotbeds, selection of cable, and wiring.

P-2-16 *LIGHT FOR SIGHT AND SITE, Darnell R. Lundstrom, PS, 8½ x 11, 4 pp., 1969, North Dakota Power Use Council, c/o Agricultural Engineering Department, North Dakota State University, Fargo, ND 58102.

Discusses lighting for the home. Includes information on total light requirements, guidelines for good lighting, incandescent lighting, fluorescent lighting, structural lighting, fixture lighting, lighting with lamps, and controls for lighting.

P-2-17 *UNDERGROUND WIRING, Darnell R. Lundstrom and Vernon L. Hofman, PS, 8½ x 11, 4 pp., 1968, North Dakota Power Use Council, c/o Agricultural Engineering Department, North Dakota State University, Fargo, ND 58102.

This bulletin covers underground wiring on farmsteads. It includes information on underground services, types of wire, installing underground cables, splicing wires, service entrance panels, and wire and conduit sizes.

P-2-18 HELP WANTED, P, S, 3½ x 8, 4 pp., 1969, sample copies free, $2.50 per 100 copies, $20.00 per 1000 copies, National Fire Protection Association, 60 Batterymarch Street, Boston, MA 02110.

This circular discusses the dangers inherent in careless use of extension cords, both two-wire and three-wire.

P-2-19 ABOUT ELECTRICITY, P, S, 3¼ x 5½, 4 pp., 1970, sample copy free, $2.00 per 100 copies, $15.00 per 1000 copies, National Fire Protection Association, 60 Batterymarch Street, Boston, MA 02110.

Covers electrical hazards in the home, and discusses how to avoid and correct them.

P-2-20 *VENTILATE YOUR POULTRY HOUSE, Pamphlet 292, Vernon M. Meyer and L. Z. Eggleton, PS, 8½ x 11, 7 pp., 1969, single copies free, additional copies $0.08 each, Publications Distribution, Printing and Publications Building, Iowa State University, Ames, IA 50010.

Explains the benefits of proper ventilation for poultry housing. Covers the importance of insulation, and illustrates the operation of an exhaust-type system. Gives fan capacities for winter and summer ventilation.

P-2-21 *VENTILATE YOUR DAIRY BARN, Pamphlet 468, Vernon M. Meyer, PS, 8½ x 11, 5 pp., 1969, single copies free, additional copies $0.17 each, Publications Distribution, Printing and Publications Building, Iowa State University, Ames, IA 50010.

Describes the requirements for successful dairy barn ventilation. Lists fan capacities for three ages of cattle. Discusses ventilation of free-stall dairy barns.

P-2-22 *VENTILATE YOUR FARROWING HOUSE, Pamphlet 394, Vernon M. Meyer and Larry D. Van Fossen, PS, 8½ x 11, 8 pp., 1967, single copies free, additional copies $0.11 each, Publications Distribution, Printing and Publications Building, Iowa State University, Ames, IA 50010.

Discusses the importance of proper insulation and vapor barriers for farrowing houses. Gives fan capacities needed for summer and winter use. Describes a combination thermostat-time switch control system. Covers the use of air conditioning with the zone ventilation system.

P-2-23 *VENTILATE YOUR SWINE FINISHING HOUSE, Pamphlet 443, Vernon M. Meyer and Larry D. Van Fossen, PS, 8½ x 11, 5 pp., 1968, single copies free, additional copies $0.13 each, Publications Distribution, Printing and Publications Building, Iowa State University, Ames, Iowa 50010.

Gives fan capacities and building requirements for satisfactory ventilation of hog finishing houses. Slot inlets are discussed and illustrated. Includes suggestions for meeting emergencies such as power failure.

P-2-24 *GUIDE TO PORTABLE LAMPS AND LIGHTING, S, PS, 8½ x 11, 12 pp., 1968, Member Services Division, National Rural Electric Cooperative Association, 2000 Florida Avenue, N. W., Washington, DC 20009.

This comprehensive guide is designed to help consumers improve the efficiency of lamp lighting in their homes, increase their comfort, and lessen the strain on their eyes when relaxing, reading, sewing, etc.

P-2-25 TYPES OF ELECTRIC HEATING EQUIPMENT, Earl Lewis, PS, 8½ x 11, 8 pp., 1968, Oklahoma Farm Electric Council and Cooperative Extension Service cooperating, Agricultural Engineering Department, Oklahoma State University, Stillwater, OK 74074.

This bulletin, designed for consumer education, reviews various types of electric heating equipment.

P-2-26 STRUCTURAL LIGHTING, Earl Lewis, PS, 8½ x 11, 5 pp., 1967, Agricultural Engineering Department, Oklahoma State University, Stillwater, OK 74074.

This guide is designed for extension home economists who are interested in fluorescent lighting.

P-2-27 COMFORT FACTORS IN THE HOME, Earl Lewis, PS, 8½ x 11, 10 pp., 1968, Agricultural Engineering Department, Oklahoma State University, Stillwater, OK 74074.

This bulletin is designed to help consumers understand heating and cooling factors which affect comfort in the home.

P-2-28 PLANNING ELECTRICAL OUTLETS IN THE HOME, Earl Lewis, PS, 6 x 9, 12 pp., 1963, Director, Cooperative Extension Service, Oklahoma State University, Stillwater, OK 74074.

Contains instructions for do-it-yourself planning of electrical outlets in the home. Covers types and sizes of circuits, and types, spacing, and number of outlets.

P-2-29 *LIGHT AND MAN—A HISTORY OF HUMAN ACHIEVEMENT, P, S, 8½ x 11, 6 pp., 1964, single copies free, classroom lots free when school address is given, Central Advertising Distribution Department, Sylvania Electric Products, Inc., 1100 Main Street, Buffalo, NY 14209.

This bulletin contains a history of light dating back to pre-historic days and continuing to the present. It's well-illustrated with lighting devices used through the ages. Includes diagrams and operating principles of modern light sources.

P-2-30 *LIGHT AND MAN—RADIANT ENERGY, P, S, 8½ x 11, 6 pp., 1968, single copies free, classroom lots free when school address is given, Central Advertising Distribution Department, Sylvania Electric Products, Inc., 1100 Main Street, Buffalo, NY 14209.

Covers the many uses to which radiant energy may be put, other than lighting.

P-2-31 *LIGHT AND MAN—UNUSUAL LIGHTING APPLICATIONS, P, S, 8½ x 11, 6 pp., 1968, single copies free, classroom lots free when school address is given, Central Advertising Distribution Department, Sylvania Electric Products, Inc., 1100 Main Street, Buffalo, NY 14209.

Through descriptive illustrations, this bulletin covers outstanding lighting installations.

P-2-32 *TAKE THE MYSTERY OUT OF ELECTRICAL SCHEMATICS, Form 848, PS, 8½ x 11, 6 pp., 1965, Furnas Electric Company, 1000 McKee Street, Batavia, IL 60510.

This bulletin lists typical device designations for electrical diagrams, and covers terminology and schematics for some of the more common basic circuits used in control systems.

P-2-33 *STOP BURNING OUT YOUR MOTORS, Form 802, PS, 8½ x 11, 4 pp., 1966, Furnas Electric Company, 1000 McKee Street, Batavia, IL 60510.

Discusses how to prevent industrial motor burnout by selecting the right kind of overload relay.

P-2-34 *TROUBLE SHOOTING ELECTRIC MOTOR CONTROLS, Form ER-2, PS, 8½ x 11, 8 pp., 1965, Furnas Electric Company, 1000 McKee Street, Batavia, IL 60510.

Describes point-by-point procedures to follow when trouble-shooting electric motor controls.

P-2-35 GROWING PLANTS UNDER FLUORESCENT LIGHT, E. J. Gildehaus, S, PS, 6 x 9, 16 pp., 1967, single copies free, Union Electric Company, P.O. Box 149, St. Louis, MO 63166.

This bulletin gives the basic information needed to successfully grow plants in the home under artificial light. It mentions the various types of lamps available, and tells how to obtain the quality and intensity of light needed. It illustrates several types of home lighting set-ups.

P-2-36 *UNDERSTANDING AND USING LIGHT, No. 70-15, Edward L. Palmer, S, PS, 6 x 9, 4 pp., 1970, single copies free, Agricultural Publications Office, Box U-35, University of Connecticut, Storrs, CT 06268.

An understanding of the basic principles of light, rules for good lighting, and recommendations on minimum levels of illumination are covered in this helpful bulletin.

P-2-37 *SELECTING AND USING ELECTRIC LIGHT BULBS, No. 70-23, Edward L. Palmer, S, PS, 6 x 9, 4 pp., 1970, single copies free, Agricultural Publications Office, Box U-35, University of Connecticut, Storrs, CT 06268.

This bulletin covers factors to consider when selecting light bulbs for general lighting, and for reading and study areas.

P-2-38 MODERNIZING YOUR WIRING SYSTEM, Fact Sheet 385, William H. Peterson, S, PS, 8½ x 11, 4 pp., 1960, single copies free, quantity prices upon request, Bulletin Room, South Dakota State University, Brookings, SD 57006.

Tells how to plan the remodeling of a typical 60-amp service entrance by adding outlets, circuits, and a new entrance, but utilizing existing equipment.

P-2-39 ELECTRIC MOTOR SELECTION, Fact Sheet 3, William H. Peterson, S, PS, 8½ x 11, 2 pp., 1959, single copies free, quantity prices upon request, Bulletin Room, South Dakota State University, Brookings, SD 57006.

Describes different types of single-phase motors, motor enclosures, bearings, grounding, and overload protection. Includes a motor selection chart.

P-2-40 *PREVENTING ELECTRIC SHOCK BY PROPER GROUNDING, William H. Peterson, S, PS, 8½ x 11, 4 pp., 1967, single copies free, quantity prices upon request, Bulletin Room, South Dakota State University, Brookings, SD 57006.

Tells how proper grounding is done, and why and how it works. Discusses unacceptable grounding methods and tells why they won't work. Lists equipment that should be grounded.

P-2-41 *FLUORESCENT LAMPS AND RADIO RECEPTION, Catalog No. TPC-26, S, PS, 8½ x 11, 4 pp., 1966, $0.03 per copy, Inquiry Bureau, General Electric Co., Nela Park, Cleveland, OH 44112.

Discusses causes and means of controlling radio interference from fluorescent lamps and circuits.

P-2-42 *HOME STUDY CENTER, Catalog No. TPO-10, S, PS, 8½ x 11, 6 pp., 1967, $0.04 per copy, Inquiry Bureau, General Electric Co., Nela Park, Cleveland, OH 44112.

Presents ideas for planning a home-study center, along with recommendations for choosing study lamps.

P-2-43 *LIGHT FACTS ABOUT LIGHT BULBS, Catalog No. TP-104, S, PS, 8½ x 11, 8 pp., 1967, $0.10 per copy, Inquiry Bureau, General Electric Co., Nela Park, Cleveland, OH 44112.

Contains a discussion, for non-technical audiences, on the history, construction, and manufacture of incandescent lamps.

P-2-44 *MANIPULATING LIGHT, Catalog No. TPL-205, S, PS, 8½ x 11, 8 pp., 1967, $0.20 per copy, Inquiry Bureau, General Electric Co., Nela Park, Cleveland, OH 44112.

Covers electric dimming systems.

P-2-45 *RESIDENTIAL STRUCTURAL LIGHTING, Catalog No. TPC-12, S, PS, 8½ x 11, 6 pp., 1968, $0.10 per copy, Inquiry Bureau, General Electric Co., Nela Park, Cleveland, OH 44112.

Presents electrical and construction details for built-in lighting.

P-2-46 PLANNING YOUR HOME LIGHTING, Home and Garden Bulletin No. 138, Ruth Hutcheson and Albert V. Krewatch, S, PS, 8 x 10¼, 22 pp., 1968, U.S. Department of Agriculture, Washington, DC 20250, or local county Extension Service Office.

This bulletin includes up-to-date facts and suggestions on light sources, portable lamps, fixtures, and structural lighting. Covers wiring, maintaining, and improving present lighting. Well-illustrated with photographs and sketches.

P-2-47 FARM LIGHTING, Farmers' Bulletin No. 2243, Albert V. Krewatch and L. E. Campbell, S, PS, 6 x 9, 16 pp., 1969, U.S. Department of Agriculture, Washington, DC 20250, or local county Extension Service Office.

This bulletin tells how to plan a lighting system. It describes the characteristics of light and gives details on lighting equipment and wiring requirements. Also, it tells how to use light to grade farm products and help get rid of nuisance insects.

P-2-48 STANDBY ELECTRIC POWER EQUIPMENT FOR THE FARM, Leaflet No. 480, Lowell E. Campbell, S, PS, 6 x 9, 8 pp., 1960, U.S. Department of Agriculture, Washington, DC 20250, or local county Extension Service Office.

Covers the need for standby electric power service, equipment required, kinds and types of generators to use, determining generator size, installation of the standby unit, operation and maintenance of the unit.

P-2-49 LIGHTING A HOME STUDY CENTER, a "how to" reprint, P, S, 4 pp., $0.15 per copy, National 4-H News, 59 E. Van Buren Street, Chicago, IL 60605.

Proper lighting makes studying easier and less tiring. This booklet explains proper lighting standards and indicates ways to tell if lighting in a home study area is adequate.

P-2-50 *CAREER OPPORTUNITIES IN THE FAST-GROWING ELECTRICAL CONSTRUCTION INDUSTRY, S, 4 x 9, 4 pp., National Electrical Contractors Association, 1730 Rhode Island Ave., N.W., Washington, DC 20036.

Aimed at youth who are planning to finish high school, but are not planning to go on to college, this careers piece outlines the size, type of work activities, entrance requirements, and salary potential in the electrical construction industry. Contains a checklist to help the individual determine if he will qualify for such a career.

P-2-51 *A PRIMER ON THE LEAD-ACID BATTERY, S, PS, 8½ x 11 printed sheet, Lead Industries Association, Inc., 292 Madison Avenue, New York, NY 10019.

Through a series of 14 questions and answers, this illustrated bulletin covers: What is a storage battery? What are amperes, volts, watts? What is ampere hour and kilowatt hour capacity? How are batteries rated? What is electrolyte? What effect does maximum specific gravity have on a battery? What is meant by battery life? How does specific gravity vary with discharge? Does voltage vary as the battery is discharged? How does the electrical size of the battery affect industrial truck operation?

Additional copies of this publication

may be ordered from:

Farm Electrification Council
Box 1008, Oak Brook, IL 60523

P-2-52 *AGRICULTURAL ENGINEERING, The Profession With A Future, P, S, 3½ x 8½ folded leaflet, free, American Society of Agricultural Engineers, St. Joseph, MI 49085.

Describes opportunities in four areas of the agricultural engineering profession, including electric power and processing.

P-2-53 BASIC PROTECTION FOR ELECTRICAL POWER SYSTEMS, PS, 8½ x 11 printed, 13 pp., Bussmann Manufacturing Division of McGraw-Edison Co., University at Jefferson, St. Louis, MO 63107.

Deals with interrupting capacity, current limitations, and coordination requirements of protective devices for various types of electrical power circuits.

P-2-54 *CAREERS IN LIGHTING, Reprinted from JETS JOURNAL, S, 8½ x 11, 10 pp., 1970, free upon request, Illuminating Engineering Society, 345 East 47th Street, New York, NY 10017.

This reprint from the publication of the Junior Engineering Technical Society is divided into four sections covering: Careers in lighting, lighting research, careers in lighting applications, the illuminating engineer as a consultant, and the engineer and IES. The single message running throughout this reprint is that illumination is an exciting career field, and the career opportunities within it are numerous.

P-2-55 *25 TECHNICAL CAREERS YOU CAN LEARN IN 2 YEARS OR LESS, S, PS, 8½ x 11, 6 pp., produced and distributed through a cooperative effort by the U.S. Office of Education and the National Industrial Conference Board, available from U.S. Office of Education, Department of Health, Education and Welfare, Washington, DC 20202.

This publication outlines career opportunities for the non-college bound youth who wants to develop his technical skills. Tells how technicians are needed in every field of science and technology. Lists 25 types of technicians now in the most demand along with a brief description of the kind of work they do. Also covers how to qualify for technical positions, and ways to help finance a technical education. Tells where to write for nationwide directories of accredited schools offering technical education, and concludes by giving starting salary ranges for technicians.

P-2-56 *THE LIGHT SIDE, S, PS, 8½ x 11, 12 pp., 1970, Membership Programs Division, National Rural Electric Cooperative Association, 2000 Florida Ave., N.W., Washington, DC 20009.

This how-to-do-it bulletin covers decorative outdoor residential lighting and the various effects which can be achieved by homeowners.

P-2-57 *PROGRAM GUIDE FOR ELECTRICAL SAFETY, T. David McFarland, S, PS, 5½ x 8½, 4 pp., 1965, single copies free, National Safety Council, 425 N. Michigan Avenue, Chicago, IL 60611.

Presents steps to follow in a community action program to improve electrical safety and reduce hazards from improper electrical practices.

P-2-58 *SAFE GROUNDING OF ELECTRICAL EQUIPMENT, S, PS, 5½ x 8½, 4 pp., 1965, single copies free, National Safety Council, 425 N. Michigan Avenue, Chicago, IL 60611.

This pamphlet stresses the need for proper electrical grounding, describes a few basics of electrical grounding, and provides a guide that an individual can use in checking his own grounding system.

P-2-59 *WHAT YOU SHOULD KNOW ABOUT ELECTRICITY, Farm Electrification Leaflet No. 71, S, PS, 8½ x 11, 4 pp., Agricultural Extension Service, University of Idaho, Moscow, ID 83843.

This informative bulletin covers electrical terms, safety requirements, electrical codes, and some typical questions and answers covering electrical equipment and wiring.

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